HONI SOIT QUI MAL Y PENSE

THE MEDAL OF THE SOCIETY.

MODELLED BY JOHN FLAXMAN, R. A.

EXECUTED BY G. F. PIDGEON & ENGRAVED BY ANKER SMITH, A. R. A.

FROM A DRAWING BY MARIA DENMAN.

Published as the Act directs Jan^y 1803.

16766

TRANSACTIONS

OF THE

SOCIETY,

INSTITUTED AT LONDON,

FOR THE

ENCOURAGEMENT

OF

ARTS, MANUFACTURES,

AND COMMERCE;

WITH THE

PREMIUMS offered in the Year 1807,

AND

THE RULES AND ORDERS OF THE SOCIETY.

VOL. XXV.

LONDON:

PRINTED BY R. WILKS, CHANCERY-LANE.

Sold by the HOUSEKEEPER, at the SOCIETY'S HOUSE, in the ADELPHI; and by Messrs. ROBSON, J. WHITE, BECKET, JOHNSON, CADELL and DAVIES, PHILLIPS, WALTER, RICHARDSON, LONGMAN and REES, TAYLOR, and WYATT.

[Price TEN SHILLINGS and SIXPENCE.]

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PREFACE.

THE Society agreed on the 4th of December, 1805, in consequence of their Medal Dies having become unfit for work, that J. Flaxman, Esq. R. A. should be desired to furnish a design for a new Medal, on the principles suggested by the late James Barry, Esq.* Mr. Flaxman most readily acceded to the request of the Society, and completed the model for the dies, which were executed in a style highly to the credit of G. F. Pidgeon, Esq. the artist. The Frontispiece to the present Volume, exhibits the obverse of the die, drawn from it with great elegance by Miss Maria Denman, and engraved by Anker Smith, A. R. A. This engraving was intended to have been inserted in the 24th Volume of the Society's Transactions, but was prevented by various incidental circumstances, and the superior manner in which it is now completed, will, it is presumed, be a sufficient apology for the delay.

The arrangements of the constituent parts of the present Volume, are upon a similar plan to the former; the various

* This was a subject respecting which Mr. Barry was particularly anxious, and his sentiments on it are fully stated in the preface to the 19th Volume of Transactions.

subjects having been placed under the several classes into which the business of the Society is divided. The Premiums offered for the session commencing in October 1807, and the Rewards bestowed in the preceding May, are the first in order; these are followed by a list of the Rules and Orders of the Society, corrected pursuant to the several alterations which have been found expedient during the progress of the Society.

The Plantations of the Right Honourable the Earl of Fife, appear to answer the most sanguine expectations of their noble owner; and in the counties of Banff, Aberdeen, and Murray, are said to amount to above thirteen thousand acres. His Lordship has set an example highly worthy of imitation.

The unremitting attention of David Day, Esq. to his Plantations of Ash Trees, has produced proofs of the great emolument arising to the owner from planting Ash Trees in a proper manner; and probably no means can be pointed out of a more certain and valuable property being raised with less trouble and more pleasure, than by the method he has here shown, and confirmed by long practice.

The Chinese method of propagating Fruit Trees by abscission, will be found deserving of trial in this climate; and there is much reason to suppose it would in many cases be followed with great success.

Great

Great deceptions have been practised by the purchasers of growing Timber from the planter, who, in some instances, have bought it for half the real value; the instrument, invented by Mr. Broad, for the Measurement of growing Timber, will render it easy for the value to be better ascertained by the proprietors of plantations.

The advantages of Irrigation of Land, where there is a command of water, has been fully shown in the former volumes of the Society's Transactions. The adjustment of the proper level to allow it to pass over the land, in a regular manner, is important; and the instrument invented by Mr. Drew is cheap and simple, and likely to conduce much to such improvements.

The Hatching of Chickens in Ovens has been pursued with success in Egypt for many centuries, and Mr. Reaumur, the celebrated French Academician, has strongly recommended the practice in Europe, and laid down many excellent rules for its accomplishment; but Mrs. D'Oyley has effected the raising of Poultry in a more certain and natural mode, which would afford an easy, pleasant, and profitable business, to many persons in the environs of London, and populous towns, and which might be attended to by females incapable of laborious employment.

Major Spencer Cochrane's Paper on the Growth of

Spring Wheat, and the Culture of Poppies, contains many useful hints upon these subjects. When it is considered that excellent opium has been produced from poppies grown in England, that the seeds of the poppies are a useful substitute for almonds in emulsion, and good for other medicinal purposes; and that the oil expressed from the seeds is equally nutritious, and frequently imported from Holland as Florence oil, and sold here as such; many inducements will be found, particularly during the present state of public affairs, to encourage an extension of the culture of this valuable plant.

Under the Class of Chymistry, the account of Lord Ribblesdale's Ore of Zinc, will engage the attention of both natural and experimental philosophers; the mode by which it was accumulated in the caverns where now found, there may be some difficulty to explain; and the various uses to which it may be applied, will interest the painter, the chymist, and the metallurgist.

Within the period of less than a century, Great Britain imported most of her Earthen Ware from foreign countries; but the improvements in our potteries have now rendered these articles a great branch of our foreign exports, even to the countries which formerly supplied us. The German Crucibles, and the different vessels for chymical uses, have, however, still continued to be imported hither. The inven-

tion

tion of Mr. Turrell will, probably, lead the way to our superiority in manufactures of chymical vessels.

The ingenious mode of Painting designed by Mrs. Hooker, in imitation of the ancient Grecian manner or encaustic painting, is curious and interesting; and the specimens she has produced, executed in this manner, display great ingenuity and effect.

Under the Class of Manufactures, Mr. Duff's invention for weaving Figured Work, has met with the approbation of many persons conversant in that line of business; and when it is considered, that the improvements in our machinery enable us to have advantages over all other nations in our foreign sales, we shall feel the necessity of giving encouragement to every invention that will contribute to maintain our superiority in commerce.

Under the head of Mechanics, the Society have paid uncommon attention to every thing likely to promote the interests of our navy; they are sensible that it demands the warm support of every man who wishes well to his country, and they are desirous of adding to its glory, comfort, and security.

The numerous accidents which occur in boats of common construction, have induced the Society to give their

Gold Medal to Mr. Wilson, for a Boat which possesses great advantages either in embarking or disembarking of troops, in affording succour to vessels in distress, or in preventing accidents from carrying too great a press of sail. It unites the powers of a secure sailing boat, with more room and greater expedition, than other boats which draw the same depth of water usually possess.

The Capstan, invented by Mr. Boswell, prevents the delay and danger attending the use of common capstans, and does not require the messenger, or cable, coiled round it, to be ever surged.

The loss of many valuable seamen by falling overboard, when ships are under way in the night, engaged the philanthropy of Mr. Shipley, the worthy founder of the Society, to invent a method of rendering them assistance in such a dangerous situation; and the adoption, on shipboard, of his Floating Light, would save the lives of many of this useful class of men.

The machine denominated by Mr. Daniel a Life Preserver when shipwrecked, has already been the means of preserving several persons from drowning. The small space it occupies when uninflated, its lightness and security, recommend it to notice; and when it is considered that a single person getting on shore by the use of one of them,

might

might be the means of procuring safety for a whole ship's crew, as would probably have been the case if one had been on board when the Abergavenny East Indiaman was lost near Weymouth, this machine becomes an object of public attention.

To the late Lieutenant Bell, of the Royal Artillery, the Society are indebted for several useful mechanical inventions. One of which is the method of forming a connection betwixt a stranded vessel and the shore, by throwing a rope on shore by means of a shell from a mortar, as described in this and their tenth Volume. Various experiments were successfully made in this manner from a vessel in the Thames, in presence of a committee appointed by the Society; and in many cases the plan would be successful in rescuing the persons and valuable property on board from destruction.

The necessity of encouraging the Growth of Hemp for naval use, has not escaped the attention of the Society; who have experienced, that our possessions in Canada are well-calculated for its culture, but deficient in machinery for its preparation. The machine of Mr. Cleall's invention for easily procuring from the plant the seed in a state fit for growth, and the machine invented by Mr. Bond for breaking or separating the woody fibres from the filaments of the hemp, it is hoped will be the means of facilitating these objects;

jects; and in furtherance thereof, the Society have ordered some extra copies of these papers to be printed for circulation gratuitously in Canada.

The unhappy situation of Climbing Boys employed in sweeping chimnies, has for several years induced the Society to attempt other means to effect the purpose; and in the 23d volume of the Society's Transactions, it will be found, that the Gold Medal of the Society was given to Mr. Smart for the greatest number of chimnies cleansed by mechanical means, without the assistance of any person within the flue. Much praise is due to this gentleman for the unremitting attention he has paid to complete machinery effectual for general use; and his machines are so perfected, as, in the opinion of the Society, to entitle him to the highest reward offered for implements and articles of this kind. For the Machine supposed next to his in merit, the Silver Medal has been given to Mr. Davis; and it is with pleasure that the Society understand, that the use of these kinds of machines are extending to different parts of the kingdom, under the auspices of the friends to humanity.

Improvements in the Clock and Watch-making line are said to have been the basis from which most of the improvements of our machinery in manufactures have originated; and the

the British export trade of clocks and watches is of itself very considerable. Mr. Hardy's method of equalizing the long and short Arcs of Vibration in Time-keepers, Mr. S. Mendham's Watch Escapement, and Mr. Ward's Compensation Pendulum, will each be found to possess considerable merit.

For domestic uses, Mr. Collier's Portable Iron Stove for culinary purposes, or heating rooms, is safe, ingenious, and useful; and the new Air-tight Door-hinge, invented by Mr. Furness, will procure warmth and comfort, and probably prevent disease.

Mr. Stass's Machine for closing Boots in a standing Posture, will prevent the disorders to which men employed in such businesses are liable from the pressure upon the stomach when working in the old method.

Mr. Gilbert Gilpin's Method of raising Coals from Mines deserves particular notice in the present crisis of public affairs, as it not only supersedes the use of hempen ropes to a very extensive degree, but has been proved to be more safe, commodious, and to work with less friction, and at less expense.

The means of facilitating the carriage of minerals and heavy articles throughout the different parts of the kingdom, is an object

object of importance, and Iron Rail-roads have been one of the advantageous plans, adopted on an extensive scale, for this purpose. Mr. Charles Le Caan's improvement of them is very ingenious and useful.

The repose of the night is frequently interrupted by the dread of housebreakers where a considerable property is at stake; the Door-pannels and Window-pannels, invented by Mr. Davis, will give a desirable security on such occasions.

Under the Class of Colonies and Trade, the Observations relative to the Encouragement of Herring Fisheries are very important. With a view to their extension, a translation of the Dutch placart or ordinance is inserted, to show the plan of their regulations for that fishery, styled by them *the principal mine and chief support of that country, and of the inhabitants therein.* A proper attention from the Government of our country would transfer this valuable mine from Holland, to become the property of our united empire.

From the East and West Indies the Society have received several curious and valuable seeds, and other articles. The account from Dr. Anderson of the flourishing state of the Royal Botanical Garden at St. Vincent, will be satisfactory

to

to all lovers of natural history, and probably tend to a connection and mutual supply of the plants in which either this country or that garden may be deficient.

Having thus taken a cursory view of the contents of the present volume, it may be necessary to add, that such further communications as will tend to improve and increase the Arts, Manufactures, and Commerce of the united empire, will ever meet with the attention of the Society, and the names of the inventors recorded in a manner honourable to themselves and beneficial to the public.

The Society, on the present occasion, express their thanks to the several public bodies and individuals from whom they have received the sundry presents noted in the present Volume.

Additions to the Library of the Society, by presents of books relative to the general subject of Arts, Manufactures, and Commerce, would be greatly conducive to the object of this institution.

The Society desire it to be clearly understood, that as a body they are not responsible for any opinion or representation of facts contained in the following pages. They have endeavoured only to compress, into a form more concise, such accounts as appeared to them too diffuse when received.

The

The annexed extensive List of Members will best explain the present flourishing state of the Society; and the session now commenced is employed in the investigation of various new communications of importance to the best interests of the united empire.

Adelphi, London,
Dec. 31, 1807.

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PREMIUMS offered in 1807, *by the* SOCIETY *instituted at* London, *A.D.* 1754, *for the Encouragement of Arts, Manufactures, and Commerce.*

ADVERTISEMENT TO THE PUBLIC.

THE chief objects of the SOCIETY are to promote the Arts, Manufactures, and Commerce of this Kingdom, by giving honorary or pecuniary Rewards, as seem to them best adapted to the case, for all such useful Inventions, Discoveries, and Improvements, (though not mentioned in this book) as tend to that purpose; and, in pursuance of this plan, the SOCIETY have already expended many THOUSAND POUNDS, advanced by voluntary subscriptions of their members, and legacies bequeathed.

The Register of the Premiums and Bounties they have given, which may be seen at the SOCIETY'S HOUSE in the *Adelphi*, will show the very great advantages which the Public have derived from this Institution.

The meetings of the SOCIETY are held every *Wednesday*, at seven o'clock in the evening, from the fourth *Wednesday* in *October* to the first *Wednesday* in *June*. The several Committees meet on other evenings in the week during the session, as particularly mentioned in their printed book of Rules and Orders.

In order still farther to promote the laudable views of the SOCIETY, it may be necessary to explain the mode by which members are elected.

Each member has the privilege, at the meetings of the SOCIETY, or by letter to the Secretary, to propose any person who is desirous to become a member, provided the proposal contains the name, with the full addition, and place of abode, of the proposed member, and is signed by three members of the SOCIETY.

Peers of the Realm or Lords of Parliament are, on their being proposed, immediately ballotted for; the names of other persons proposed to become members are to be delivered to the Secretary, read at the next meeting of the SOCIETY, and then inserted in lists which are hung up in the Society's room: they are ballotted for at the second following ordinary meeting. In both cases, if two-thirds of the members then voting ballot in their favour, they are deemed perpetual members, upon payment of not less than Twenty Guineas in one sum, or subscribing members, upon payment of any sum not less than Two Guineas annually.

All members are entitled to vote and assist in all the business of the SOCIETY and the several Committees. The members have also the privilege of recommending two persons as Auditors at the meetings of the SOCIETY, and by addressing a note to the housekeeper, of introducing their friends to examine the various Models, Machines, and Productions, in different branches of Arts, Manufactures, and Commerce, for which rewards have been bestowed; also to inspect the magnificent series of moral and historical Paintings, executed by the late J. BARRY, Esq. which, with some valuable Busts, Statues, &c. decorate the Great Room.

Members have the use of the Society's Library, which is valuable, and annually increasing, from donations of scientific and useful books and engravings. The SOCIETY are highly sensible of the great importance of such acquisitions, and are happy to record them, with the names of the donors, in the Volume annually published of the SOCIETY'S Transactions, to which the members are entitled.

Ladies are eligible, as members of the SOCIETY, to all the privileges thereof, and are alone entitled to vote by proxy at elections, through the medium of any gentleman who is a member, on his producing a written authority for the same.

The time appointed for admission to the Paintings or Models, is from ten to two o'clock, Sundays and Wednesdays excepted.

ORDERED, SOCIETY'S HOUSE, ADELPHI, JUNE 1st, 1807.

That the several Candidates and Claimants, to whom the Society shall adjudge Premiums or Bounties, do attend at the Society's House, in the Adelphi, on the last Tuesday in May, 1808, *at Eleven in the Morning precisely, to receive the same; that day being appointed by the Society for the Distribution of their Rewards: And before that time no Premium or Bounty will be delivered, excepting to those who are about to leave the Kingdom.*

In cases where the Society may think fit to admit excuses for not attending in person, Deputies may be substituted to receive the Rewards, provided such Deputies are either Members of the Society, or superior Officers thereof.

C. WHITTINGHAM, Printer, 103, Goswell Street.

PREMIUMS IN AGRICULTURE.

Article 1. Acorns.

FOR having set, between the first of October, 1805, and the first of April, 1806, the greatest quantity of land, not less than ten acres, with acorns, with or without seeds, cuttings, or plants of other trees, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

2. For the second greatest quantity of land, not less than five acres, set agreeably to the above conditions; the silver medal.

Certificates of setting agreeably to the above conditions, and that there are not fewer than three hundred young oaks on each acre, to be delivered to the Society on or before the first Tuesday in December, 1807.

3. Raising Oaks. To the person who shall have raised, since the year 1803, the greatest number of oaks, not fewer than five thousand, either from young plants or acorns, in order to secure a succession of oak timber in this kingdom; the gold medal.

4. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates that there were on the land, at least the number of young oak-trees required, in a thriving condition, two years after the planting, with an account of the methods pursued in making and managing the plantation, to be produced to the Society on or before the first Tuesday in January, 1808.

5. Ascertaining the best Method of raising Oaks. To the person who shall ascertain in the best manner, by actual experiments, the comparative merits of the different modes of raising oaks for timber, either from acorns set on land properly dug or tilled, from acorns set by the spade or dibble, without digging or tillage, either on a smooth surface, or among bushes, fern, or other cover; or from young plants, previously raised in nurseries, and transplanted; regard being had to the expense, growth, and other respective advantages of the several methods; the gold medal.

The *accounts*, and proper *certificates*, that not less than one acre has been cultivated in each mode, to be produced to the Society on or before the first Tuesday in November, 1807.

6. Chesnuts. For having sown or set, between the first of October, 1805, and the first of April, 1806, the greatest quantity of land, not less than six acres, with Spanish chesnuts, with or without seeds, cuttings, or plants of other trees, adapted to such soil, at the option of the candidate; and for effectually fencing and preserving the same, in order to raise timber; the gold medal.

7. For the second greatest quantity, not less than four acres; the silver medal.

Certificates of sowing or setting, agreeably to the above conditions, and that there are not fewer than three hundred chesnut plants, in a thriving state, on each acre, to be delivered to the Society on or before the first Tuesday in January, 1808.

8. Elm. For having planted the greatest number of the English elm, not less than eight thousand, between the twenty-fourth of June, 1805, and the twenty-fourth of June, 1806; and for having effectually fenced and preserved the same in order to raise timber; the gold medal.

9. For the second greatest number, not less than five thousand; the silver medal.

Certificates of having planted agreeably to the above conditions, that the plants were in a healthy and thriving state two years at least after making the plantation, and specifying the distance of the plants, to be delivered to the Society on or before the first Tuesday in April, 1808.

10. Larch. For having planted out, between the twenty-fourth of June, 1804, and the twenty-fourth of June, 1805, the greatest number of larch-trees, not fewer than five thousand, and for having effectually fenced and preserved the same, in order to raise timber; the gold medal.

11. For the next greatest number, not fewer than three thousand; the silver medal.

Certificates of the number of plants, that they were in a healthy and thriving state two years at least after they were planted out, with a general account of the methods used in making the plantation, to be delivered to the Society on or before the last Tuesday in December, 1807.

N. B. The larch-trees may be planted, either mixed with other trees, or by themselves, as may best suit the convenience of the planter.

12. Ash. For having sown or set, in the year 1804, the greatest quantity of land, not less than six acres, with ash for timber, with or without seed, cuttings or plants, of such other trees as are adapted to the soil; the gold medal.

13. For the next greatest quantity, not less than four acres; the silver medal.

Certificates of the sowing or setting, agreeably to the above conditions, that there are not fewer than six hundred ash plants on each acre, in a thriving and healthy condition, two years at least after the sowing or setting, with a general account of the methods used in making the plantation; to be delivered to the Society on or before the last Tuesday in December, 1807.

N. B. *It is the intention of the Society, that such lands only as are not calculated for the*

purposes of Husbandry, should be employed for the purposes specified in these advertisements.

14. FOREST-TREES. To the person who shall have enclosed and planted, or set, the greatest number of acres (not less than ten) of land, that is incapable of being ploughed, such as the borders of rivers, the sides of precipices, and any land that has too many rocks, or that is not calculated to repay the expense of tillage, owing to the surface being too hilly, mountainous, or otherwise unfit for tillage, with the best sorts of forest-trees, namely, oak, Spanish chesnuts, ash, elm, beech, alder, willow, larch, spruce, and silver fir, with or without screens of Scotch fir, adapted to the soil, and intended for timber-trees, between the first of October, 1804, and the first of April, 1805; the gold medal.

15. For the second greatest quantity of land, not less than seven acres; the silver medal.

A particular *account* of the methods used in making and managing the plantations, the nature of the soil, the probable number of each sort of plants, together with proper *certificates* that they were in a healthy and thriving state two years at least after making the plantation, to be delivered to the Society on or before the first Tuesday in December, 1807.

N. B. With the above-forest trees, the seeds, cuttings, or plants, of such other trees as are adapted to the soil, and proper for underwood, may or may not be intermixed.

The candidates for planting all kinds of trees are to produce certificates that the respective plantations are properly fenced and secured, and particularly to state the condition of the plants at the time of signing such certificates. Any information which the candidates for the foregoing premiums may choose to communicate, relative to the methods made use of in forming the plantations, or promoting the growth of the several trees, or any other observations that may have occurred on the subject, will be thankfully received.

16. SECURING PLANTATIONS OF TIMBER-TREES, AND HEDGE-ROWS. To the person who shall give to the Society the most satisfactory account, founded on experience, of the most effectual and least expensive method of securing young plantations of timber-trees, and hedge-rows, from hares and rabbits, as well as sheep and larger cattle, which at the same time shall be least subject to the depredations of wood-stealers; the silver medal.

The *accounts*, and *certificates* of the efficacy of the method, to be produced to the Society on or before the first Tuesday in December, 1807.

17. COMPARATIVE CULTURE OF WHEAT, BROAD-CAST, DRILLED, AND DIBBLED. For the best set of experiments, made on not less than twelve acres, four of which to be sown broad-cast, four drilled, and four dibbled, the two latter in equidistant rows, in order fully to ascertain which is the most advantageous mode of cultivating wheat; the gold medal.

It is required that every operation and expense of each mode of culture be fully described; and that proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce of the corn, the weight per bushel, and also of the straw, be produced to the Society on or before the first Tuesday in February, 1808.

18. BEANS AND WHEAT. To the person who shall have dibbled or drilled between the 1st of December, 1806, and the 1st of April, 1807, the greatest quantity of land, not less than ten acres, with beans, in equidistant rows, and hoed the intervals twice or oftener, and shall have sown the same land with wheat in the autumn of the year 1807; the gold medal.

It is required that an *account* of the sort and quantity of beans, the time of dibbling or drilling, and of reaping or mowing them, the produce per acre thrashed, the expense of dibbling or drilling, hand or horse hoeing, the distance of the rows, and the quality of the soil, together with *certificates* of the number of acres, and that the land was afterwards actually sown with wheat, be produced on or before the second Tuesday in March, 1808.

19. BEANS. To the person who, in the year 1806, shall discover and cultivate, either by the drill or dibbling method, on not less than five acres, a species of horse-beans or tick-beans, that will ripen their seeds before the 21st of August; the silver medal.

It is required that a particular account of the bean, the cultivation, and the expense attending it, with proper *certificates* of the nature and condition of the land on which the experiments were made, together with an *account* of the produce, the weight per Winchester bushel, and a sample of not less than a peck, be produced to the Society on or before the first Tuesday in December, 1807. It is apprehended that, if a bean should be brought into cultivation with the habits of the hotspur, or other early peas, that it would, in a great measure, escape the danger arising from the collier-insect, or other insects, and allow more time for the farmers to till the land for the subsequent crop of wheat. The *accounts* and *certificates* to be delivered on or before the first Tuesday in December, 1807.

20. PARSNIPS. To the person who in the

year 1807, shall cultivate the greatest quantity of land, not less than five acres, with parsnips, for the sole purpose of feeding cattle or sheep; the gold medal.

Certificates of the quantity of land so cultivated, with a particular *account* of the nature of the soil and weight of the produce on sixteen perches, and also of the condition of the cattle or sheep fed with the parsnips, and the advantages resulting from the practice, to be produced to the Society on or before the second Tuesday in February, 1808.

21. Buck Wheat. To the person who shall cultivate the greatest quantity of land with buck wheat, not less than thirty acres; the gold medal.

It is required that the time of sowing and reaping be noticed; also a particular *account* of the species, cultivation, and expense attending it, the manner of reaping it, thrashing it, and housing the grain; with proper *certificates* of the nature and condition of the land on which the experiments were made, and the name of the crop, if any, which the same land bore the preceding year, together with an *account* of the produce, and a sample of the seed, not less than a quart, be produced to the Society on or before the second Tuesday in January, 1808.

22. For the next greatest quantity, not less than fifteen acres, on similar conditions; the silver medal.

Information respecting its application to the feeding of cattle, hogs, and poultry, and other of its uses, is also desired. It is known to be particularly serviceable in furnishing honey to bees.

23. Raising Grass Seeds. To the person who shall raise the greatest quantity of each of any of the following named grass seeds, *viz.*—Meadow fox-tail (alopecurus pratensis), sweet-scented vernal grass (anthoxanthum odoratum), Timothy grass, (phleum pratense), meadow fescue grass (festuca pratensis), smooth-stalked meadow grass (poa pretensis), rough-stalked meadow grass (poa trivialis); the silver medal.

It is required that *certificates* from persons who have viewed them in a proper state, to identify that they are one or other of the seeds above mentioned, indicating clearly the particular species, and noticing the quantity produced of such seeds, free from weeds or mixture of other grasses, together with proper samples of the seeds, be produced to the Society on or before the first day of February, 1808.

24. Preserving Turnips. To the person who shall discover to the Society the best and cheapest method of preserving turnips perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

It is required that a full and accurate *account* of the method employed, and the expense attending the process, together with *certificates* that the produce of four acres at the least have been preserved according to the method described, and applied to the feeding of sheep and neat cattle; that the whole were drawn out of the ground before the first day of February, in order to clear the greater part of it previous to its being prepared for corn, and to save the soil from being exhausted by the turnips; and also of the weight of an average sixteen perches of the crop; be produced to the Society on or before the first Tuesday in December, 1807.

25. For the next in quantity and merit, on not less than two acres; the silver medal.

26. Preserving Cabbages. To the person who shall discover to the Society the best and cheapest method of preserving drum-headed cabbages perfectly sound, and in every respect fit for the purpose of supporting and fattening sheep and neat cattle during the months of February, March, and April; the gold medal.

27. For the next in quantity and merit, on not less than two acres; the silver medal.

Conditions the same as for preserving turnips, Art 24. And the *accounts* to be produced on or before the first Tuesday in December, 1807.

28. Preserving Carrots, Parsnips, or Beets. To the person who shall discover to the Society the best and cheapest method of preserving carrots, parsnips, or beets, perfectly sound, and in every respect fit for the purpose of supporting horses, and fattening sheep and neat cattle, during the months of February, March, and April; the gold medal.

Conditions the same as for preserving turnips, Art. 24. And the *accounts* to be delivered in on or before the first Tuesday in December, 1807.

29. For the next in quantity and merit, on not less than two acres; the silver medal.

30. Preserving Potatoes. To the person who shall discover to the Society the best and cheapest method of preserving potatoes, two or more years, perfectly sound, without vegetating, and in every other respect fit for the purpose of sets and the use of the table, and, consequently of supporting and fattening cattle; the gold medal, or thirty guineas.

It is required, that a full and accurate *account* of the method employed, and the expense attending the process, with *certificates* that one hundred bushels at the least have been preserved according to the method de-

scribed, and that one or more bushels of the same potatoes have been set, and produced a crop without any apparent diminution of their vegetative power, and also that they have been used at table, with entire satisfaction to the person who eat of them, together with a sample of one bushel, be sent to the Society on or before the first Tuesday in December, 1807.

31. For the next greatest quantity, not less than fifty bushels; the silver medal.

32. MAKING MEADOW-HAY IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of making meadow-hay in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than fifty-six pounds of the hay; and *certificates* that at least the produce of six acres of land has been made according to the method described, and that the whole is of equal quality with the sample; to be produced on or before the first Tuesday in January, 1808.

33. HARVESTING CORN IN WET WEATHER. To the person who shall discover to the Society the best and cheapest method, superior to any hitherto practised, of harvesting corn in wet weather; the gold medal.

A full *account* of the method employed, and of the expense attending the process, with not less than two sheaves of the corn, and *certificates* that at least the produce of ten acres has been harvested according to the method described, and that the whole is of equal quality with the samples, to be produced on or before the first Tuesday in January, 1808.

34. GAINING LAND FROM THE SEA. To the person who shall produce to the Society an account, verified by actual experiment, of his having gained the greatest quantity of land from the sea, not less than fifty acres, on the coast of Great Britain or Ireland; the gold medal.

Certificates of the quantity of land, and that the experiments were begun after the first of January, 1801, to be produced to the Society on or before the last Tuesday in November, 1807.

35. The same premium is extended one year farther.

Certificates to be produced on or before the last Tuesday in November, 1808.

36. IMPROVING LAND LYING WASTE. For the most satisfactory *account* of the best method of improving any of the following soils, being land lying waste or uncultivated, *viz.* clay, gravel, sand, chalk, peat-earth and bog, verified by experiments on not less than fifty acres of land; the gold medal.

37. For the next greatest quantity, not less than thirty acres; the silver medal.

It is required, that the land, before such improvement, be absolutely uncultivated, and in a great measure useless, and that, in its improved state, it be enclosed, cultivated, and divided into closes.

Certificates of the number of acres, of the quality of the land so improved, with a full *account* of every operation and expense attending such improvement, the state it is in as to the proportion of grass to arable, and the average value thereof, to be produced on or before the first Tuesday in February, 1808.

38. MANURES. For the most satisfactory set of experiments, to ascertain the comparative advantages of the following manures, used as top-dressings on grass and corn land, *viz.* soot, coal-ashes, wood-ashes, lime, gypsum, night soil, or any other fit article; the gold medal. It is required that the above experiments be made between two or more of the above-mentioned manures, and that no less than two acres of land be dressed with each manure.

An *account* of the nature of the soil, quantity, and expense of the manure and crops, with *certificates*, to be produced on or before the last Tuesday in February, 1808.

39. RAISING WATER FOR THE IRRIGATION OF LAND. To the person who shall discover to the Society the cheapest and most effectual method of raising water in quantities sufficient to be beneficially employed for the purpose of irrigating land, superior to, and cheaper than any other method now in use; the gold medal, or fifty guineas.

A model, on a scale of one inch to a foot, with *certificates* that a machine at large, on the same construction, has been used, specifying the quantity of water delivered in gallons per hour, and the height to which it was raised, to be produced to the Society on or before the first of March, 1808.

40. PARING PLOUGH. To the person who shall invent and produce to the Society, a machine or plough for the purpose of paring land preparatory to burning, superior to any hitherto known, or in use for such purpose, and to be worked by not more than one man and two horses; the silver medal, or twenty guineas.

The machine, and *certificates* that at least three acres have been pared by it in a proper manner, to be produced to the Society on or before the first of January, 1808.

41. MACHINE FOR DIBBLING WHEAT. To the person who shall invent a machine, superior to any hitherto known or in use, to answer the purpose of dibbling wheat, by

which the holes for receiving the grain may be made at equal distances and proper depths; the silver medal and ten guineas.

The *machine*, with *certificates* that at least three acres have been dibbled by it, to be produced to the Society on or before the second Tuesday in January, 1808.

42. Machine for Reaping or Mowing Corn. For inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats, or beans, by which it may be done more expeditiously and cheaper than by any method now practised, provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner that it may be easily gathered up for binding; the gold medal.

The *machine*, with *certificates* that at least three acres have been cut by it, to be produced to the Society on or before the second Tuesday in December, 1807. Simplicity and cheapness in the construction of this and the preceding machine, will be considered as principal parts of their merit.

43. Thrashing Machine. To the person who shall invent a machine by which corn of all sorts may be thrashed more expeditiously, effectually, and at a less expense, than by any method now in use; the gold medal.

The *machine*, or a model, with proper *certificates* that such a machine has been usefully applied, that at least thirty quarters have been thrashed by it, and of the time employed in the operation, to be produced to the Society on or before the last Tuesday in February, 1808.

44. Destroying the Grub of the Cockchafer. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying the grub of the cockchafer, or of preventing or checking the destructive effects which always attend corn, peas, beans, and turnips, when attacked by those insects; the gold medal.

The *accounts*, with proper *certificates*, to be produced on or before the first Tuesday in January, 1808.

45. Destroying Worms. To the person who shall discover to the Society an effectual method, verified by repeated and satisfactory trials, of destroying worms, or of preventing the destructive effects they occasion on corn, beans, pease, or other pulse; the silver medal.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1808.

46. Destroying the Fly on Hops. To the person who shall discover to the Society an easy and efficacious method of destroying the fly on hops, superior to any hitherto known or practised, on not less than four acres of hop ground; the gold medal.

Accounts and *certificates* to be delivered to the Society on or before the first Tuesday in February, 1808.

47. Preventing the Blight, or Ravages of Insects, on Fruit-Trees and Culinary Plants. To the person who shall discover to the Society the most effectual method of preventing the blight or ravages of insects on fruit-trees and culinary plants, superior to any hitherto known or practised, and verified by actual and comparative experiments; the silver medal.

The *accounts*, with proper *certificates*, to be delivered to the Society on or before the second Tuesday in December, 1807.

48. Cure of the Rot in Sheep. To the person who shall discover to the Society the best and most effectual method of curing the rot in sheep, verified by repeated and satisfactory experiments; the gold medal.

It is expected that the candidates furnish accurate *accounts* of the symptoms and cure of the disease, together with the imputed cause thereof, and the actual or probable means of prevention, which, with proper *certificates*, must be delivered to the Society on or before the first Tuesday in February, 1808.

49. Cure of the Foot-Rot in Sheep. To the person who shall discover to the Society the best and most effectual method of curing the foot-rot in sheep; the silver medal.

It is required that the cure be ascertained by repeated and satisfactory experiments, and the method of performing it be verified by proper *certificates* delivered to the Society on or before the first Tuesday in February, 1808.

50. Preventing the ill Effects of Flies on Sheep. To the person who shall discover to the Society the most effectual method of protecting sheep from being disturbed and injured by flies; the silver medal.

It is required, that the method be ascertained by repeated experiments, and that a *certificate* of its efficacy be delivered to the Society on or before the first Tuesday in December, 1807.

51. Protecting Sheep. To the person who, in the year 1806, shall protect the greatest number of sheep, not fewer than one hundred, by hovels, sheds, or any other means, and give the most satisfactory account, verified by experiment, of the advantages arising from the practice of protecting sheep from the inclemency of the weather, by hovels, sheds, or any other means; the gold medal.

A particular *account* of the experiments made, with the advantages arising therefrom, together with the expense, and *certificates* of its utility, to be produced to the Society on or before the first Tuesday in March, 1808.

N. B. It is required that the *certificates* shall specify the length of time the sheep were so protected, and the manner in which they were maintained during that time; together with the general method of managing them.

52. Culture of Hemp in certain parts of Scotland. The Society wishing to encourage the growth of hemp for the use of the navy in certain parts of Scotland, comprehending the whole county of Argyle, that part of Perthshire, situated to the north of the river Tay, and west of the Military Road (see Ainsley's Map of Scotland) leading from Logierait to the county of Inverness, and such other parts of Scotland as lie north of Inverness-shire, offers to the person who shall sow with hemp, in drills at least eighteen inches asunder, the greatest quantity of land in the above-mentioned district, not less than fifty acres statute measure, in the year 1807, and shall at the proper season cause to be plucked the summer hemp, (or male hemp bearing no seed) and continue the winter hemp (or female hemp bearing seed) on the ground until the seed is ripe; the gold medal.

53. To the person who shall sow with hemp, in drills at least eighteen inches asunder, the next greatest quantity of land in the above-mentioned district, not less than twenty-five acres, statute measure, in the year 1807, and shall at the proper season cause the same to be plucked as above-mentioned; the silver medal.

Certificates of the number of acres, of the distance of the drills, of the plucking of the hemp, with a general *account* of the soil, cultivation, and produce, to be delivered to the Society, along with fourteen pounds of the hemp and two quarts of the seed, on or before the second Tuesday in January, 1808.

PREMIUMS FOR DISCOVERIES AND IMPROVEMENTS IN CHEMISTRY, DYEING, AND MINERALOGY.

54. Preserving Seeds of Vegetables. For the best method of preserving the seeds of plants in a state fit for vegetation a longer time than has hitherto been practised, such method being superior to any known to the public, and verified by sufficient trial, to be communicated to the Society on or before the first Tuesday in December, 1807; the gold medal, or thirty guineas.

55. Preventing the Dry-rot in Timber. To the person who shall discover to the Society the cause of the dry-rot in timber, and disclose a certain method of prevention superior to any hitherto known; the gold medal, or thirty guineas.

The *accounts* of the cause, and method of prevention, confirmed by repeated experiments, to be produced to the Society on or before the second Tuesday in December, 1807.

56. Preserving salted Provisions from becoming rancid or rusty. To the person who shall discover to the Society the best, cheapest, and most efficacious method of preserving salted provisions from growing rancid or rusty; the gold medal, or thirty guineas.

A full *description* of the method, with proper *certificates* that it has been found, on repeated trials, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1808.

57. Refining Whale or Seal Oil. For disclosing to the Society an effectual method of purifying whale or seal oil from the glutinous matter that incrusts the wicks of lamps, and extinguishes the light, though fully supplied with oil; the gold medal, or fifty guineas.

It is required that the whole of the process be fully and fairly disclosed, in order that satisfactory experiments may be made by the Society to determine the validity of the claim; and *certificates* that not less than twenty gallons have been purified according to the process delivered in, together with two gallons of the oil, in its unpurified state, and two gallons so refined, to be produced to the Society, on or before the Second Tuesday in February, 1808.

58. Manufacturing Tallow Candles. To the person who shall discover to the Society a method of hardening or otherwise preparing tallow, so that candles may be made of it which will burn as clear and with as small a wick as wax candles, without running, and may be afforded at a less expense than any at present made with spermaceti; the gold medal, or thirty guineas.

Certificates that 112lb. of such tallow have been made into candles, and 12lb. of the candles made thereof, to be produced to the Society on or before the second Tuesday in January, 1808.

59. Candles from Resin or other Substances. To the person who shall discover to the Society the best method of making candles of resin, or any other substance, fit for common use, at a price much inferior to those made of tallow only; the gold medal, or thirty guineas.

Six pounds at least of the candles so prepared, with an *account* of the process, to be delivered to the Society on or before the first Tuesday in December, 1807.

60. METHOD OF SEPARATING SUGAR IN A SOLID FORM FROM TREACLE. To the person who shall discover to the Society the best method of separating sugar from treacle, in a solid form, at such an expense as will render it advantageous to the public; the gold medal, or fifty guineas.

A quantity of the sugar so prepared, in a solid form, not less than thirty pounds weight, with an *account* of the process, and *certificates* that not less than one hundred weight has been prepared, to be produced to the Society on or before the first Tuesday in February, 1808.

61. INCREASING STEAM. To the person who shall invent and discover to the Society a method, verified by actual experiments, of increasing the quantity or force of steam, in steam-engines, with less fuel than has hitherto been employed, provided that in general the whole amount of the expenses in using steam-engines may be considerably lessened; the gold medal, or thirty guineas.

To be communicated to the Society on or before the first Tuesday in January, 1808.

62. SUBSTITUTE FOR TAR. To the person who shall invent and discover to the Society the best substitute for Stockholm tar, equal in all its properties to the best of that kind, and prepared from materials the produce of Great Britain; the gold medal, or one hundred guineas. A quantity of the substitute, not less than one hundred weight, with *certificates* that at least one ton has been manufactured, and that it can be afforded at a price not exceeding that of the best foreign tar, together with an *account* of the process, to be delivered to the Society on or before the first Tuesday in March, 1808.

63. PREPARATION OF TAN. To the person who shall prepare, in the most concentrated form, so as to be easily portable, and at a price applicable to the purposes of manufacturers, the largest quantity, not less than one hundred weight, of the principle called by the French *tannin*, which abounds in oak-bark and many other vegetable substances; the gold medal, or thirty guineas.

Certificates of the superior quality of the quantity so prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1808.

64. INDELIBLE INK. To the person who shall discover to the Society a method of making a black ink proper for writing, superior to any at present known, indestructible by chemical applications, and not dearer than that which is now in common use; the silver medal, or fifteen guineas.

Certificates that not less than two gallons of such ink have been actually prepared, and found to possess the qualities above mentioned, with a full detail of the process of making it, and two quarts of the ink, to be delivered to the Society on or before the second Tuesday in January, 1808.

65. PREPARATION OF A RED STAIN FOR COTTON CLOTH. To the person who shall communicate to the Society the cheapest and most effectual method of printing or staining cotton cloths with a red colour, by an immediate application of the colouring matter to the cloth, equally beautiful and durable with the red colours now generally procured from decoctions of madder; the gold medal, or thirty guineas.

Certificates that the above process has been advantageously used on ten pieces of calico, each twenty-one yards or upwards in length; one piece of the calico so printed, a quart of the colour in a liquid state, and a full *account* of the preparation and application, to be produced to the Society on or before the second Tuesday in January, 1808.

66. PREPARATION OF A GREEN COLOUR FOR PAINTING COTTON CLOTH. To the person who shall communicate to the Society the best and cheapest method of printing with a full green colour on cotton cloth, by an immediate application of the colouring matter from a wooden block to the cloth, equally beautiful and durable as the colours now formed from the complicated process of the decoction of weld on alumine, and the solutions of indigo by earths or alkaline salts; the gold medal, or thirty guineas.

Certificates and conditions as for premium 65.

67. RENDERING MUSLIN LESS COMBUSTIBLE. To the person who shall discover to the Society a method of rendering muslin less combustible, to be effected by a cheaper and more effectual mode than any hitherto known; the silver medal.

Specimens of the muslin so prepared, with a full account of the process employed for the purpose, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. It is expected that the means employed should neither injure the quality, nor stain the muslin, nor damage any print or dye with which it may be coloured.

68. SUBSTANCE FOR THE BASIS OF PAINT. To the person who shall produce to the Society the best substitute, superior to any hitherto known, for the basis of paint, equally proper for the purpose as the white-lead now employed; such substitute not to be of a

noxious quality, and to be afforded at a price not materially higher than that of white-lead; the gold medal, or one hundred guineas.

A quantity of the substitute, not less than 50lb. weight, with an *account* of the process used in preparing it, and *certificates* that at least one hundred weight has been manufactured, to be produced to the Society on or before the first Tuesday in January, 1808.

69. RED PIGMENT. To the person who shall discover to the Society a full and satisfactory process for preparing a red pigment, fit for use in oil and water, equal in tone and brilliancy to the best carmines and lakes now known or in use, and perfectly durable; the gold medal, or thirty guineas.

One pound weight of such colour, and a full disclosure of its preparation, to be produced to the society on or before the first Tuesday in February, 1808.

N. B. It is not required that the colour should resist the action of fire or chemical applications, but remain unaltered by the common exposure to strong light, damps, and noisome vapours.

70. ULTRAMARINE. To the person who shall prepare an artificial Ultramarine, equal in colour, brilliancy, or durability, to the best prepared from lapis lazuli, and which may be afforded at a cheap rate; the gold medal, or thirty guineas.

The conditions are the same as in the preceding premium for the red pigment.

71. BLUE PIGMENT FROM IRON. To the person who shall invent, and discover to the Society, the best blue pigment from iron, superior to Antwerp or Prussian blue in colour and durability, fit for use in oil or water, which may be afforded at a cheap rate; the gold medal, or thirty guineas.

One pound weight of the colour, and a full disclosure of its preparation, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. It appears from the analysis of lapis lazuli by Klaproth, and the experiments of Guyton, (related in the Annales de Chemie) that ultramarine is a blue sulphurat of iron, and that a blue substance much resembling it is constantly found amongst the scoriæ of blast furnaces where iron is reduced, the Society by offering the above premium wishes to call the attention of persons to these facts, and encourage them to make experiments, in the hope of producing a blue pigment which may be substituted for ultramarine.

72. DESTRUCTIVE EFFECTS FROM MOTHS. To the person who shall discover to the Society a cheap, easy, and effectual method, verified by repeated and satisfactory trials, of preventing the destructive effects occasioned by moths and other insects, in furs, woollens, and other articles, superior to any hitherto known or practised, the silver medal; or fifteen guineas.

The *accounts*, with proper *certificates*, to be produced to the Society on or before the first Tuesday in January, 1808.

73. STATUARY MARBLE. To the person who shall discover, within Great Britain or Ireland, a quarry of white marble fit for the purposes of statuary, and equal in all respects to those kinds now imported from Italy; the gold medal, or one hundred pounds.

A block of at least three feet in length, two in height, and two in width, with an account of the situation of the quarry, and *certificates* of its possessing considerable extent, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. In order to prevent useless expense or trouble to the claimant in forwarding so large a block, the Society will be ready to examine any smaller specimen of the marble, and express their opinion of its value to the candidate before the block required by the above premium is produced.

74. PREPARATION OF SULPHURIC ACID FROM SULPHUR WITHOUT THE USE OF ANY NITRIC SALT. To the person who shall prepare the largest quantity (not less than one ton) of sulphuric acid from sulphur, without any nitric salt, of a specific gravity, not inferior to the best sulphuric acid of commerce; the gold medal, or fifty guineas.

Certificates that not less than the above quantity of such an acid has been prepared, together with a sample, to be produced to the Society on or before the first Tuesday in January, 1808.

75. PREPARATION OF ANY ALKALINE OR EARTHEN NITRATE. To the person who shall prepare, in Great Britain, the largest quantity, not less than one hundred weight, of any salt of nitric acid, with either earths or alkalis, by a method superior to, and as cheap as those hitherto practised; the gold medal, or one hundred guineas.

Certificates of the above quantity having been prepared, and a sample of not less than 28lb. to be produced to the Society on or before the last Tuesday in January, 1808.

76. FINE BAR-IRON. To the person, in Great Britain, who shall make the greatest quantity of bar-iron, not less than ten tons, with coak, from coak pigs, equal in quality to the best iron imported from Sweden or Russia, and as fit for being converted into steel; the gold medal, or fifty guineas.

Samples, not less than one hundred weight, with *certificates* that the whole quantity is of equal quality, to be produced to the Society on or before the first Tuesday in January, 1808.

77. PRESERVING IRON FROM RUST. To

the person who shall invent and discover to the Society a cheap composition, superior to any now in use, which shall effectually preserve wrought iron from rust; the gold medal, or fifty guineas.

A full description of the method of preparing the composition, with *certificates* that it has stood at least two years unimpaired, being exposed to the atmosphere during the whole time, to be produced to the Society, with ten pounds weight of the composition, on or before the first Tuesday in January, 1808.

78. REFINING BLOCK-TIN. To the person who shall discover to the Society the best method of purifying or refining block-tin, so as to render it fit for the finest purposes to which grain-tin is now applied, and not higher in price; the gold medal, or fifty guineas.

Certificates, that not less than three tons have been so refined or purified, with a full detail of the process, and a quantity, not less than one hundred weight, of the tin so refined, to be produced to the Society on or before the first Tuesday in January, 1808.

79. GLAZING EARTHEN-WARE WITHOUT LEAD. To the person who shall discover to the Society the cheapest, safest, most durable, and most easily fusible composition, fit for the purpose of glazing the ordinary kinds of earthen-ware, without any preparation of lead, and superior to any hitherto in use; the gold medal, or thirty guineas.

Specimens of the ware so glazed, with proper *certificates* of its having succeeded, and a sample of the materials made use of, to be produced to the Society on or before the first Tuesday in February, 1808.

80. REFINING COPPER FROM THE ORE. To the person who shall discover to the Society the best method of separating, purifying, and refining copper from the ore, so as to render it fit for the finest purposes to which fine copper is now applied, and by a process superior to any hitherto known or in use, and not higher in price; the gold medal, or fifty guineas.

Certificates, that not less than three tons have been so prepared or refined, and a quantity not less than one hundred weight of the copper so refined, to be produced to the Society on or before the first Tuesday in February, 1808.

81. MINERALOGICAL MAP OF ENGLAND AND WALES. To the person who shall complete and publish an accurate mineralogical map of England and Wales, on a scale of not less than ten miles to an inch, containing an account of the situation of the different mines therein, and describing the kinds of minerals thence produced; the gold medal, or fifty guineas.

Certificates of the accuracy of such map, together with the map, to be produced to the Society on or before the first Tuesday in February, 1808. The map to remain the property of the Society.

82. MINERALOGICAL MAP OF IRELAND. The same premium is offered for a mineralogical map of Ireland, on similar conditions.

83. MINERALOGICAL MAP OF SCOTLAND. The same premium is offered for a mineralogical map of Scotland, on similar conditions.

84. NATURAL HISTORY. To the author who shall publish, in the year 1807, the natural history of any county in England or Wales; the gold medal, or fifty guineas.

It is required that the several natural productions, whether animal, or vegetable, or mineral, peculiar to the county, or found therein, be carefully and specifically arranged and described, in order that the public may be enabled to judge what arts or manufactures are most likely to succeed in such county. The work to be delivered to the Society on or before the last Tuesday in January, 1808.

PREMIUMS IN POLITE ARTS.

85. HONORARY PREMIUMS FOR DRAWING, BY NOBILITY. For the best original drawing of any kind, by young gentlemen under the age of twenty-one, sons or grandsons of peers or peeresses in their own right, of Great Britain or Ireland; the honorary medal of the Society in gold.

86. The silver medal for the best copy.

87—88. The same premiums will be given, on the like conditions, to young ladies, daughters or grand-daughters of peers or peeresses in their own right, of Great Britain or Ireland.

89. HONORARY PREMIUMS FOR DRAWING, BY GENTLEMEN. For the best original drawing, of any kind, by young gentlemen under the age of twenty-one; the gold medal.

90. For the best copy, the silver medal.

91—92. The same premiums will be given for drawings by young ladies.

N. B. As the foregoing honorary premiums are intended only for such of the nobility and gentry as may hereafter become patrons or patronesses of the arts; persons professing any branch of the polite arts, or any business dependent on the arts of design, or the sons or daughters of such persons, will not be admitted candidates in these classes.

93. PREMIUMS FOR DRAWINGS IN GENERAL. For the best original drawing of any kind, by persons of either sex, under the age of twenty-one; the gold medal.

94. For the best copy; the silver medal.

95. HISTORICAL DRAWINGS. For the best historical drawing, being an original composition of three or more human figures, the height of the principal figure not less than eight inches, by persons of either sex under twenty-one years of age; the gold medal.

96. For the next in merit; the silver medal.

97. DRAWINGS OF OUTLINES. For the best outline, after the plaster cast, of any antique statue, by persons of either sex under the age of twenty-one, the figure not less than eighteen inches; the silver medal.

98. PAINTINGS IN OIL. For the best painting in oil, of a landseape after nature, the size thirty-six by twenty-eight inches, by persons of either sex under twenty-five years of age; the gold medal.

99. For the next in merit, the silver medal. Each candidate must mention from whence the view was taken.

100. DRAWING OF LANDSCAPES. For the best drawing, in water-colours, of a landscape after nature, not less than eighteen inches by twelve, by persons of either sex under twenty-one years of age; the silver medal.

101. DRAWINGS BY ENGRAVERS' PUPILS. For the best finished drawing of the fighting Gladiator, from a cast the size of the original marble, the size of the drawing not less than eighteen inches, by persons under twenty-one years of age; the silver medal.

102. ENGRAVING OF PORTRAITS. To the person who shall eomplete the best portrait engraved in the line manner; the gold medal.

It is required, that two impressions of the engraving be produced, and to remain the property of the Society.

103. For the next in merit; the silver medal, on similar conditions.

104. LINE ENGRAVINGS OF HISTORICAL SUBJECTS. For the best historical engraving of any size; the gold medal.

105. For the next in merit; the silver medal.

106. LINE ENGRAVINGS OF LANDSCAPES. For the best line engraving of a landscape, the gold medal.

107. For the next in merit; the silver medal.

N. B. It is not neeessary, in the classes of line engravings, for the artist's name to be concealed. The first aquafortis proof is required to be sent in with two finished impressions. The aquafortis proof, and the two impressions, to remain the property of the Society.

108. PERSPECTIVE DRAWINGS OF MACHINES. For the best perspeetive drawings of machines, by persons under twenty-one years of age; the silver medal.

109. ENGRAVING ON WOOD OR METAL BLOCKS, &c. For the best engraving on wood or metal blocks, after the manner of Albert Durer or Holbein's Dance of Death, of an historical subjeet; the size of the principal figure not less than six inches in height, and the block to be at least twelve inches by nine; the gold medal.

Two or more impressions, with the block, to be produced to the Soeiety. The impressions, but not the block, to remain the property of the Society.

110. For the next in merit; the silver medal, on similar eonditions.

111. BRONZES. For the best drapery figure or group cast in bronze; if a single figure, not less than twelve inches high; and if a group, not less than nine inehes; and which will require the least additional labour to repair; the gold medal, or the silver medal and twenty guineas.

The east to be exhibited to the Society before it is begun to be repaired, with the original figure or group, together with a full explanation of the whole process.

112. MEDAL DIE ENGRAVING. For the best die engraving of one or more heads after the engraver's own model; the gold medal.

113. For the next in merit, the silver medal.

114. For the best die engraving of one figure, or a group consisting of not more than three figures, after the engraver's own model; the gold medal.

115. For the next in merit; the silver medal.

The dies, and two impressions or casts, and the model, in each claim for medal die sinking, to be produced to the Soeiety. The impressions or casts, but not the model or die, to remain the property of the Society.

116. ARCHITECTURAL DESIGNS. For the best original design of a proper repository for the Society's models, consisting of plan, elevation, and section, the design not to exceed forty-five squares of building on the ground plan; the gold medallion. The drawing to remain the property of the Society.

For the next in merit; the silver medallion, on similar conditions.

The following inscription to be engraved on these medallions: *The Premium given by the Society for the Encouragement of Arts, Manufactures, and Commerce, in conformity to the Will of John Stock, of Hampstead, Esq.*

CONDITIONS
FOR THE POLITE ARTS.

All the claims under this class are to be produced to the Society on or before the last Tuesday in February, 1808; and no other ar-

ticles in the class of Polite Arts to be admitted into the Society with a view to bounties after the last Tuesday in March.

No person who has gained the first premium in any class shall be admitted a candidate in a class of an inferior age; and no candidate shall receive more than one premium in one year.

No person shall be admitted a candidate in any class, who has already obtained the first premium in that class.

No more than one performance in any class shall be received from the same candidate.

All performances (to which premiums or bounties are adjudged) shall remain with the Society till after the first Wednesday in June, when they will be re-delivered, unless mentioned in the Premiums to the contrary.

No performance shall be admitted, that has obtained a premium, reward, or gratification, from any other society, or academy, or been offered for that purpose.

All performances that obtain premiums in the Polite Arts must have been begun after the publication of such premiums, except line engravings.

It is required, that the matters for which premiums are offered, be delivered in without names, or any intimation to whom they belong; that each particular thing be marked in what manner each claimant thinks fit, such claimant sending with it a paper sealed up, having on the outside a corresponding mark, and on the inside the claimant's name, residence, and age; which paper is not to be opened unless the candidate be successful, or by a special vote of the Society.

To encourage real merit, and prevent attempts to impose on the Society, by producing drawings made or retouched by any other person than the candidate, the Society require a specimen of the abilities of each successful candidate, under the inspection of the Committee of Polite Arts, in every instance where such proof may appear necessary.

All candidates in the Polite Arts are required to signify, on their drawings, whether the performances are originals or copies; and if copies, whence they were taken.

PREMIUMS FOR ENCOURAGING AND IMPROVING MANUFACTURES.

117. Cloth from Hop-Stalks, &c. To the person who shall produce to the Society the greatest quantity, not less than 30 yards of cloth, at least 27 inches wide, made in Great Britain or Ireland, of hop-stalks or bines, or other raw vegetable substances, the produce of Great Britain or Ireland, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as cloth of equal quality and appearance now made from hemp, flax, or cotton, and much finer in quality than any hitherto manufactured in England from hop-stalks, &c. the gold medal, or thirty guineas.

One pound of the thread of which the cloth is made, and thirty yards of the cloth, together with proper *certificates* that the whole is manufactured from hop-stalks or bines, &c. to be produced to the Society on or before the first Tuesday in December, 1807.

N. B. The Society is already in the possession of cloth made in England from hop-stalks or bines, which may be inspected by application to the Housekeeper.

118. Hogs' Bristles. To the person who shall prepare the greatest quantity of bristles, from swine bred in the united kingdoms, equal in quality to those imported from Russia or Prussia, and at as cheap a rate; the silver medal, or fifteen guineas.

Certificates, that not less than one hundred weight have been so prepared, and a sample of not less than fourteen pounds of such bristles, to be produced to the Society on or before the last Tuesday in February, 1808.

119. Wicks for Candles or Lamps. To the person who shall discover to the Society a method of manufacturing hop-stalks or bines, or any other cheap material, the growth of Great Britain, so as to render them equally fit for the purpose of supplying the place of cotton, for wicks of candles or lamps; twenty guineas.

Samples, not less than five pounds weight, of the wick so prepared, to be produced to the Society on or before the last Tuesday in December, 1807, with *certificates* that the whole quantity is equal in quality to the sample.

120. Experiments to ascertain the proper Thickness of Wicks for Candles. To the person who shall make known to the Society the most satisfactory result of a series of experiments, actually made by him to determine the best thickness of cotton wicks for candles, so as to obviate the defects of those commonly used; the silver medal, or ten guineas.

Certificates, that not less than one hundred weight have been so made, and six pounds of the candles, to be produced to the Society on or before the last Tuesday in Feruary, 1808.

N. B. The intention in offering this premium, is to ascertain the proper thickness or bulk of the wick in proportion to that of the

tallow, and to remove the unpleasant consequences and waste arising from the sparkling, or guttering of the candles in common use.

121. PAPER FROM RAW VEGETABLE SUBSTANCES. To the person in Great Britain, or Ireland, who shall, between the first of January, 1087, and the first of January, 1808, make the greatest quantity, and of the best quality, (not less than ten reams) of good and useful paper, from raw vegetable substances, the produce of Great Britain or Ireland, of which one hundred weight has not been used in manufacturing paper previous to January, 1806, superior to any hitherto manufactured from such substances, and which can be generally afforded as cheap as paper of equal quality and appearance now made from rags; twenty guineas.

N. B. The object of the Society being to add to the number and quantity of raw materials used in this manufacture, it is their wish to include every useful sort of paper, and to introduce such natural products as can be easily and cheaply procured in great quantities. The Society are in possession of two volumes containing a great variety of specimens of paper made from raw vegetable substances, viz. nettles, potatoe-haulm, poplar, hop-bines, &c. which volumes may be inspected by any person on application to the Housekeeper.

Certificates of the making such paper, and one ream of the paper, to be produced on or before the second Tuesday in January, 1808.

122. TRANSPARENT PAPER. To the person who shall discover to the Society a method of making paper from the pulp, that shall be perfectly transparent, and of a substance and body equal to foolscap, that shall take and bear common writing ink with the same facility and correctness as writing-paper generally in use; the silver medal, or twenty guineas.

Certificates of the making such paper, an *account* of the process, and one ream of the paper, to be produced on or before the second Tuesday in January, 1808.

123. CHINTS PATTERNS FOR CALICO PRINTERS. For the best original pattern in a new taste, of light or dark-ground chintz for garment-work, or furniture, fit for the purposes of calico-printers, by persons of either sex; the gold medal. The pattern for which the premium is adjudged to remain the property of the Society.

124. For the next in merit; the silver medal, on similar conditions.

125. COPPER-PLATE PATTERNS FOR CALICO-PRINTERS. For the best pattern, in a new style, fit for the purposes of calico-printers for garment work, or furniture; the silver medal. The pattern for which the premium is adjudged to remain the property of the Society.

N. B. The patterns to be produced on or before the last Tuesday in February, 1808.

PREMIUMS IN MECHANICS.

126. GUNPOWDER-MILLS. To the person who, in the year 1807, shall invent and bring to perfection the most effectual method of so conducting the works of gunpowder-mills, in the business of making gunpowder, as to prevent explosion; the gold medal, or one hundred guineas.

Certificates and *accounts* of the method having been put in practice in one or more gunpowder-mills in this kingdom, and that it promises, in the opinion of the best judges concerned in such works, to answer the purpose intended, to be produced to the Society on or before the first Tuesday in February, 1808.

N. B. As an encouragement to persons to turn their thoughts to improvements of this nature, if any should be made on the present method of conducting the business of gunpowder making, which fall short of the total prevention of explosion, and they are sent to the Society for the sake of humanity, the papers so sent in will receive due consideration, and such bounty or reward will be bestowed as they may appear to merit.

127. TRANSIT INSTRUMENT. To the person who shall invent and produce to the Society a cheap and portable transit-instrument which may easily be converted into a zenith-sector, capable of being accurately and expeditiously adjusted for the purpose of finding the latitudes and longitudes of places, and superior to any portable transit-instrument now in use; the gold medal, or forty guineas.

To be produced on or before the last Tuesday in January, 1808.

128. TAKING WHALES BY THE GUN-HARPOON. To the person who, in the year 1807, shall strike the greatest number of whales, not fewer than three, with the gun-harpoon; ten guineas.

Certificates of the striking such whales, and that they were actually taken in the year 1807, signed by the master, or by the mate, when the claim is made by the master, to be produced to the Society on or before the last Tuesday in December, 1807.

129. FAMILY-MILL. To the person who shall invent and produce to the Society the best-constructed mill for grinding corn for the use of private families, or parish-poor;

the construction to be such as to render the working of the mill easy and expeditious, and superior to any hitherto in use; the gold medal, or thirty guineas.

The mill, and *Certificates* of its having been used to good effect, to be produced to the Society on or before the first Tuesday in February, 1808. Cheapness and simplicity will be considered as essential parts of its merit; and the mill or a model, to remain with the Society.

130. MACHINE FOR RAISING COALS, ORE, &c. &c. To the person who shall invent a machine for raising coals, ore, &c. from mines, superior to any hitherto known or in use; and which shall produce the effect at a less expense than those already known, or in use; the gold medal, or fifty guineas.

A model of the machine, made on a scale of not less than one inch to a foot, with a *Certificate* that a machine at large on the same construction has been advantageously used, to be produced to the same Society on or before the second Tuesday in February, 1808.

131. IMPROVED WALKING-WHEEL, OR CRANE. To the person who shall invent an improved walking-wheel or crane, on which the weight and power of any person or persons shall be applied with the greatest safety and effect, and so contrived that the power can be varied according to the greater or less weight to be raised or lowered; the gold medal, or thirty guineas.

The model on a scale of not less than one inch to a foot, with a proper *Certificate* that the machine at large has been employed to good effect, to be produced to the Society on or before the second Tuesday in February, 1808.

132. MACHINE FOR RAISING WATER. To the person who shall invent a machine on a better, cheaper, and more simple construction than any hitherto known or in use for raising water out of wells, &c. from a depth of not less than fifty feet; the gold medal, or thirty guineas.

Certificates of the performance of the machine, and a model of it, on a scale of not less than one inch to a foot, to be produced to the Society on or before the first Tuesday in February, 1808.

133. ELM PIPES. To the person who shall invent and discover to the Society a substitute for the elm pipes now in common use for the conveyance of water, which shall be cheaper, equally effectual, and more durable than any heretofore employed; the gold medal, or thirty guineas.

It is required that one of the pipes so employed, an accurate *account* of the method used, and every expense attending it, together with satisfactory accounts of its being effectual, be delivered to the Society on or before the second Tuesday in January, 1808.

134. LAYING WOODEN PIPES. To the person who shall invent and discover to the Society a superior method of laying or connecting the wooden pipes now in use for conveying water, so as to lessen the injury they receive thereby; the silver medal, or fifteen guineas.

It is required that a model, an accurate account of the method used, and every expense attending it, together with satisfactory *Certificates* of its being effectual, be delivered to the Society, on or before the second Tuesday in January, 1808.

135. EXTINGUISHING FIRES. To the person who shall produce to the Society the best and most effectual method of procuring an immediate supply of water in case of fire, or for the means best calculated to prevent or extinguish accidental fires in buildings, superior to any now in use; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the second Tuesday in January, 1808.

136. BORING AND BLASTING ROCKS. To the person who shall discover to the Society a more simple, safe, cheap, and expeditious method than any hitherto known or in use, of boring or blasting rocks in mines, shafts, wells, &c.; the gold medal, or thirty guineas.

Certificates of the method having been practised with success, with a full description thereof, to be delivered to the Society on or before the first Tuesday in January, 1808.

137. HEATING ROOMS FOR THE PURPOSE OF MANUFACTURERS. To the person who shall invent and discover to the Society a method of heating rooms, superior to any hitherto known or in use, and at a moderate expense, for the purpose of painters, japanners, and other manufacturers, so as to avoid the necessity of iron or copper tunnels going through the rooms to convey the smoke, whereby the danger from such tunnels may be prevented; the gold medal, or forty guineas.

A model or complete drawing and description of the method, with *Certificates* that it has been successfully practised, to be delivered to the Society on or before the last Tuesday in March, 1808.

138. IMPROVED VENTILATION. To the person who shall invent and produce to the Society a mode of permanently ventilating the apartments in hospitals, workhouses, and other crowded places, superior to any now

known or used; the gold medal, or fifty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, with proper *Certificates*, to be delivered to the Society on or before the last Tuesday in February, 1808.

139. Preventing Accidents from Horses falling with two-wheeled Carriages. To the person who shall invent and produce to the Society a method, superior to any hitherto known or in use, to prevent accidents from the falling of horses with two-wheeled carriages, especially on steep declivities; the silver medal, or fifteen guineas.

A model of the apparatus, and a full account of the means by which the effect has been produced, with proper *Certificates* that the same has been used with success, to be delivered to the Society on or before the second Tuesday in January, 1808.

140. Improving Turnpike and other Roads. To the person who shall discover to the Society the most effectual and cheapest method, verified by actual experiments, of combining the materials ordinarily employed in making or repairing roads, so as to form them of the hardest consistency by their cementing properties, or by an artificial mixture of earth, stones, &c. altered by heat or any other mode, so as to form an even, hard, and durable carriage-road, not liable to be injured by heat or rain; the gold medal, or thirty guineas.

It is required that an accurate *account* of the method used, and every expense attending it, together with satisfactory *Certificates* of its being effectual, be delivered to the Society on or before the first Tuesday in March, 1808.

141. Raising the Bodies of Persons who have sunk under Water. To the person who shall invent and produce to the Society a cheap and portable drag, or other machine, superior to those now in use, for the purpose of taking up, in the best and most expeditious manner, and with the least injury, the bodies of persons who have sunk under water; the gold medal, or thirty guineas.

The drag, or machine to answer the purpose intended, to be produced to the Society on or before the first Tuesday in March, 1808.

142. For preventing prejudicial effects to the Persons employed in Pointing Needles. To the person who shall invent and produce to the Society a mode of obviating the prejudicial effects that attend the operation of pointing needles, by grinding them dry, during which the particles of grindstone, dust, and steel, being thrown into the air, and received with it into the lungs, occasion asthma, consumption, and other painful disorders; the gold medal, or thirty guineas.

A model of the apparatus, and a full *account* of the means by which the effect has been produced, together with proper *Certificates* of its practicability and adoption, to be delivered to the Society on or before the second Tuesday in March, 1808.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE COMMERCE OF THE UNITED EMPIRE.

143. Taking Porpoises. To the people in any boat or vessel, who, in the year 1807, shall take the greatest number of porpoises on the coast of Great Britain or Ireland, by gun, harpoon, or any other method, not fewer than thirty, for the purpose of extracting oil from them; the gold medal, or thirty pounds.

Certificates of the number, signed by the persons to whom they have been sold or delivered for the purpose of extracting the oil, to be produced to the Society on or before the last Tuesday in January, 1808.

144. Oil from Porpoises. To the person who shall manufacture the greatest quantity of oil from porpoises taken on the coast of Great Britain or Ireland, in the year 1806, not less than twenty tons; the gold medal, or thirty pounds.

Certificates of the oil having been made from porpoises actually caught on the coast of Great Britain or Ireland, and two gallons of the oil as a sample, to be produced to the Society on or before the last Tuesday in February, 1808.

145. Curing Herrings by the Dutch Method. To the person or persons who shall, before January 1808, cure the greatest quantity of white herrings, not less than thirty barrels, according to the method practised by the Dutch, and equal in all respects to the best Dutch herrings, the same being caught in the British or Irish seas, and cured in a British or Irish vessel or port; the gold medal, or fifty guineas.

146. For the next greatest quantity, not less than fifteen barrels; the silver medal, or twenty guineas.

A sixteen-gallon barrel of the herrings to be produced to the Society on or before the first Tuesday in February, 1808, with *Certificates* that the conditions of the premium have been fulfilled, and that the whole were cured in the same manner as the specimen, together with a full description of the process

employed, in order that the Society may judge how far the Dutch method has been adopted.

147, 148. The same premiums are extended one year further. *Certificates* to be produced on or before the first Tuesday in February, 1809.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH COLONIES.

149. NUTMEGS. For the greatest quantity of merchantable nutmegs, not less than ten pounds weight, being the growth of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, and equal to those imported from the islands of the East Indies; the gold medal, or fifty guineas.

Satisfactory *certificates*, from the governor, or commander in chief, of the place of growth, with an *account* of the number of trees, their age, nearly the quantity of fruit on each tree, and the manner of culture, to be produced on or before the first Tuesday in December, 1807.

150. The same premium is extended one year farther.

Certificates to be produced on or before the first Tuesday in December, 1808.

151. KALI FOR BARILLA. To the person who shall have cultivated, in the Bahama Islands, or any other part of his Majesty's dominions in the West Indies, or any of the British settlements on the coast of Africa, or the several islands adjacent thereto, in the year 1806, the greatest quantity of land, not less than two acres, with Spanish kali fit for the purpose of making barilla; the gold medal, or thirty guineas.

152. For the next greatest quantity, not less than one acre; the silver medal, or fifteen guineas.

Certificates, signed by the governor, or commander in chief, for the time being, of the quantity of land so cultivated, and of the state of the plants at the time of signing such *certificates*, to be delivered to the Society, with samples of the kali, on or before the second Tuesday in January, 1808.

153. The same premiums are extended one year farther.

Certificates to be produced on or before the second Tuesday in January, 1809.

154. DESTROYING THE INSECT COMMONLY CALLED THE BORER. To the person who shall discover to the Society an effectual method of destroying the insect commonly called the Borer, which has of late years been so destructive to the sugar-canes in the West-India islands, the British settlements on the coast of Africa, and the several islands adjacent thereto; the gold medal, or fifty guineas.

The discovery to be ascertained by satisfactory *certificates*, under the hand and seal of the governor or commander in chief for the time being, and of some other respectable persons, inhabitants of the islands, or other place, in which the remedy has been successfully applied; such *certificates* to be delivered to the Society on or before the first Tuesday in January, 1808.

155. The same premium is extended one year farther.

Certificates to be produced on or before the first Tuesday in January, 1809.

156. CULTIVATION OF HEMP IN UPPER OR LOWER CANADA. To the person who shall sow with hemp, the greatest quantity of land in the province of Upper Canada, not less than six arpents, (each four-fifths of a statute acre) in the year 1807, and shall at the proper season cause to be plucked the summer hemp, or male hemp bearing no seed, and continue the winter hemp, or female hemp bearing seed, on the ground until the seed is ripe; the gold medal, or one hundred dollars.

157. To the person who shall sow with hemp the next greatest quantity of land in the same province of Upper Canada, not less than five arpents in the year 1807, in the manner above mentioned; the silver medal, or eighty dollars.

158. For the next greatest quantity of land, in the same province, and in a similar manner, not less than four arpents; sixty dollars.

159. For the next greatest quantity of land, in the same province, and in a similar manner, not less than three arpents; forty dollars.

160. For the next greatest quantity of land, in the same province, and in the same manner, not less than one arpent; twenty dollars.

Certificates of the number of arpents, the method of culture, of the plucking of the hemp, with a general *account* whether sown broad-cast or in drills, the expense, soil, cultivation, and produce, to be transmitted to the Society, certified under the hand and seal of the governor or lieutenant-governor, together with 28lb. of the hemp, and two quarts of the seed, on or before the last Tuesday in November, 1808.

161 to 165. Premiums exactly similar in all respects to those held out for the province of Upper Canada, are also offered for the province of Lower Canada, and are extended to the same period.

166. IMPORTATION OF HEMP FROM CANADA. To the master of that vessel which shall bring to this country the greatest quantity of marketable hemp, not less than one hundred tons, in the year 1807, the produce of Upper or Lower Canada; the gold medal.

167. To the master of that vessel which shall bring the next quantity, not less than fifty tons; the silver medal.

Certificates satisfactory to the Society to be produced by the master of the vessel on or before the first Tuesday in February, 1808, to testify that such hemp was grown and prepared in Canada.

168. SUBSTITUTE FOR HEMP. To the person who, in the year 1808, shall discover and produce to the Society a substitute for hemp, equally cheap, durable, and applicable to all the purposes for which hemp is now used; the gold medal, or fifty guineas.

A quantity of the substitute, not less than one hundred weight, together with proper *certificates* from the governor or commander in chief, if raised in any of the British colonies, or from the Secretary of the Board of Trade, if raised in the East Indies, to prove that the same has been used with success, to be produced to the Society on or before the last Tuesday in February, 1809.

169. The same premium is extended one year farther.

Certificates to be produced on or before the last Tuesday in February, 1810.

PREMIUMS OFFERED FOR THE ADVANTAGE OF THE BRITISH SETTLEMENTS IN THE EAST INDIES.

170. BHAUGULPORE COTTON. To the person who shall import into the port of London, in the year 1807, the greatest quantity, not less than one ton, of the Baughulpore cotton, from which cloths are made in imitation of nankeen, without dyeing; the gold medal.

A quantity of the cotton, not less than five pounds weight, in the pod, and five pounds carded, to be produced to the Society, with proper *certificates*, signed by the Secretary to the Board of Trade of Bengal or Bombay, on or before the last Tuesday in Feb. 1808.

171, 172. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

173. ANNATTO. To the person who, in the year 1807, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of annatto, not less than five hundred weight; the gold medal.

A quantity of the annatto, not less than ten pounds weight, to be produced to the Society, with proper *certificates*, signed by the Secretary of the Board of Trade of the respective settlement, that the annatto is the produce of such settlement, on or before the last Tuesday in February, 1807.

174, 175. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

176. TRUE COCHINEAL. To the person who, in the year 1807, shall import into the port of London, from any part of the British settlements in the East Indies, the greatest quantity of true cochineal, not less than five hundred weight; the gold medal.

A quantity of the cochineal, not less than ten pounds weight, with proper *certificates*, signed by the secretary of the Board of Trade of the respective settlement, that the cochineal is the produce of such settlement, to be produced to the Society on or before the first Tuesday in February, 1808.

177, 178. The same premium is extended two years farther.

Certificates to be produced at the same time of the years ensuing.

GENERAL CONDITIONS.

As the great object of the Society in rewarding individuals is to draw forth and give currency to those inventions and improvements, which are likely to benefit the public at large, candidates are requested to observe, that if the *means*, by which the respective objects are effected, do require an expense or trouble too great for *general purposes*, the Society will not consider itself as bound to give the offered *reward*; but, though it thus reserves the power of giving in all cases such part only of any premium as the performance shall be adjudged to deserve, or of withholding the whole if there be no merit, yet the candidates may be assured the Society will always judge liberally of their several claims.

All candidates are to take notice, that no claim for a premium will be attended to, unless the conditions of the advertisement are fully compiled with.

All models of machines, which obtain premiums or bounties, shall be the property of the Society; and, where a premium or bounty is given for any machine, a perfect model and description thereof shall be given to the Society.

All the premiums of this Society are designed for Great Britain and Ireland, unless expressly mentioned to the contrary.

The claims shall be determined as soon as possible after the delivery of the specimens.

It is expected that all articles for claims or bounties be sent to the Society, carriage paid.

No person shall receive any premium, bounty, or encouragement, from the Society, for any matter for which he has obtained, or purposes to obtain, a patent, or for which he has obtained, or expects any premium or reward from any other Society.

A candidate for a premium, or a person applying for a bounty, being detected in any disingenuous method to impose on the Society, shall forfeit such bounty, and be deemed incapable of obtaining any for the future.

No member of this Society shall be a candidate for, or entitled to receive, any premium, bounty, or reward whatsoever, except the honorary medal of the Society. The candidates are, in all cases, expected to furnish a particular account of the subject of their claims; and where certificates are required to be produced in claim of premiums, they should be expressed, as nearly as possible, in the words of the respective advertisements, and be signed by persons who have a positive knowledge of the facts stated.

Where premiums or bounties are obtained in consequence of specimens produced, the Society mean to retain such part of those specimens as they may judge necessary, making a reasonable allowance for the same.

No candidate, not a member, shall be present at any meetings of the Society or committees, or admitted at the Society's rooms, after they have delivered in their claims, until such claims are adjudged, unless summoned by the Committee.

The Society, anxious to promote the Arts of their country, have adopted the resolution of forming a Collection of Prints, to be open for public inspection; and, having arranged those already in their possession, invite engravers to send etched or finished proofs of their plates: and hope that amateurs, collectors, and publishers of works of art, will also contribute to the undertaking.

Prints of machines, or maps, will also come within the above arrangement.

The Society farther invite the communications of scientific and practical men, upon all subjects connected with the views of the Society, although their experiments may have been conducted upon a smaller scale than the terms required by the premiums; as such communications may afford ground for more extensive application, and thus materially contribute to the advantage of the public.

The Library of the Society, which has already become very valuable, may yet receive considerable additions and improvements from the presents of members, or other persons who may be inclined to place useful books or valuable manuscripts in a repository, at once permanent and conducive to the national benefit.

All communications are to be made by letter, addressed to Dr. Charles Taylor, the Secretary, *at the Society of Arts, &c. Adelphi, London.*

The Winchester bushel is the measure referred to for grain; and, as the acres of different districts vary in extent, it is necessary to observe, that the Society mean Statute Acres of five and a half yards to the rod or pole, when acres are mentioned in their list of premiums; and they request that all communications to them may be made agreeably thereto.

The Society desire that the Papers on different subjects sent to them may be full, clear, explicit, fit for publication, and rather in the form of Essays than of Letters; and that descriptive Drawings may be sent, with the Models and Machines laid before the Society.

*** To persons inclined to leave a sum of money to this Society by will, the following form is offered for that purpose.

Item. I give and bequeath to A. B. and C. D. the sum of upon condition and to the intent that they, or one of them, do pay the same to the Collector, for the time being, of a Society in London, who now call themselves the Society for the Encouragement of Arts, Manufactures, and Commerce; which said sum of I will and desire may be paid out of my personal estate, and applied towards the carrying on the laudable designs of the Society.

N. B. The Society for the Encouragement of Arts, &c. considering that it would be beneficial to the Commerce of the United Kingdom to bring the British Marbles into more general use, and that the most effectual method of accomplishing their object would be, for the present, *to make them more generally known in the capital, have come to the following resolutions:—*

Resolved,—That specimens of British Marbles be exposed in the Society's Rooms at the Adelphi, for the inspection of the public, under the following regulations:

1st, That all specimens be exact to a given size, *viz.* eight inches high, six inches broad, one inch thick, and polished on one face.

2d, That a book be kept, containing the number of each specimen, and describing the situation of the quarry, the name of the parish where situated, the distance of the quarry from a beaten road, and the distance of that road from water-carriage, with the name of the donor and proprietor. Any remarks on the qualities of the marbles, or on the lime produced from them, will be gratefully received and preserved by the Society, as materials for future inquiries.

Resolved,—That as the exertions of the Society can be beneficial to the public, only inasmuch as their views are seconded by the public, the Society request, that all persons, proprietors of marble quarries, will favour them with a specimen of the marble, worked to the exact size above mentioned, with the description of the quarry as above, that the same may be entered in the book to be preserved for the use of the public.

Premiums and Rewards bestowed in May, 1807, by the Society of Arts, Manufactures, and Commerce, Adelphi.

ON Tuesday the 26th of May, 1807, the Rewards of the Society were, as usual, distributed by his Grace the Duke of Norfolk, arranged under the following classes; and on Wednesday the 3rd of June, the Society held the last Meeting of that Session, and adjourned to the fourth Wednesday in October next.

IN AGRICULTURE.

To David Day, Esq. of West-hill, near Rochester, for plantations of ash trees, and accurate accounts of the profits attending them, the silver medal.

To Major Spencer Cochrane, of Muirfield House, near Haddington, North Britain, for the culture of spring wheat, and the use of the extract of poppies in diseases of cattle, the silver medal.

To Mrs. Hannah D'Oyly, of Sion Hill, near Northallerton, Yorkshire, for a new method of rearing poultry to advantage, the silver medal.

IN CHEMISTRY.

To the Right Hon. Lord Ribblesdale, of Gisburne Park, for his communication respecting a mine of zinc, and his application of the ore as a paint, the silver medal.

To Mr. Edmund Turrell, 40, Rawstorne-street, Goswell-street Road, for his construction of muffles for chemical purposes, ten guineas.

IN POLITE ARTS.

To J. Flaxman, Esq. R. A. Buckingham Place, for the design of the Society's new medal, modelled and presented by him, the first gold medal.

To Miss Maria Denman, Buckingham-place, for her drawings of the new medal, the silver medal.

To Miss S. C. Day, Lower Bryanstone-street, Portman-square, for an original drawing of the teacher taught, class 87; the silver medal.

To Miss Barrow, Navy Pay Office, Somerset-house, for a drawing of the Castle Acre Priory, Norfolk, class 88; the silver medal.

To Miss Eliza L. Jones, of Leadenhall-street, for an original drawing of the mill at Redbourne Bury, class 97; the silver medal.

To Edward Bury, Esq. Pulteney-street, Bath, for an original painting of a view from King's Weston of Lord de Clifford's house and adjacent country, the silver medal.

To Joseph Woollett, Esq. Gould-square, Crutched-friars, for an original drawing of West Horsley, Surrey, the silver medal.

To Mr. Henry Parke, Dean-street, Soho, for a drawing of shipping, the silver medal.

To Miss Brooke, Cork-street, Burlington-gardens, for a miniature painting of Angelica and Medoro, the silver medal.

To Miss Louisa George, Park-place, St. James's, for a drawing of King Edward IV. and Lady Grey, the silver medal.

To Miss Aspinall, Quality-court, Chancery-lane, for a drawing of a dying warrior, the silver medal.

To Miss Hannah Hancock, St. Helen's, Norwich, for an oil painting, from a copy by Gasper Crayer, of Rubens's Antwerp Altar Piece, the silver medal.

To Mr. J. B. Lane, South-street, Finsbury-square, for an original historical drawing of the four angels unloosed, class 91; the gold medal.

To Mr. William Fuller Pocock, Southampton-street, for an original ornamental drawing of an architectural design, the silver medallion of the society, *in conformity to the*

will of the late John Stock, Esq. of Hampstead, class 108.

To Anthony Cardon, Esq. of London-street, Fitzroy-square, for his engravings of the battle of Alexandria, and of the principal officers engaged in the Egyptian expedition, the silver medal set in gold.

To Lewis Schiavonetti, Esq. V. A. for his engraving of the landing of the British troops in the bay of Aboukir, the silver medal set in gold.

To Mr. R. Branston, Wynyat-street, Islington-road, for his engraving on wood, of a scene in the play of King John, class 106; the silver medal.

To Mr. Robert Carpenter, Bathwick, Bath, for a carving in wood of Abigail, the wife of Nabal, supplicating David, the lesser silver pallet.

To Miss Hillier, Holles-street, for a drawing of a syeamore branch, the greater silver pallet.

To Miss F. H. Barlow, Somerset-place, Somerset-house, for a drawing of flowers, the greater silver pallet.

To Miss Hilare Barlow, Somerset-place, Somerset-house, for a drawing of a landscape, the greater silver pallet.

To Miss Maria Denman, Buckingham-place, for a beautiful plaster model of a Cupid's head, the silver medal.

To Mr. Thomas Denman, High Holborn, for a plaster model of Antinous, the lesser silver pallet.

To Mr. Henry Sass, King-street, Holborn, for an outline of the Laocoon and two Sons, class 93; the silver medal.

To Mr. Henry Daniel Thielcke, Stafford-place, Pimlico, for a drawing of the Hercules Farnese, class 98; the silver medal.

To Mr. W. Finden, Warren-street, Fitzroy-square, for a drawing of the Hercules Farnese, the greater silver pallet.

To Mr. Thomas Jameson, of Ambleside, Westmoreland, for an original drawing of a landscape, the greater silver pallet.

To Mr. Denis Dighton, Charing-cross, for an original drawing of Julius Cæsar landing in Britain, the greater silver pallet.

To Master W. C. Ross, Bow-street, Covent-garden, for a drawing of the death of Wat Tyler, the lesser silver pallet.

IN MANUFACTURES.

To Mr. Alexander Duff, Church-street, Bethnal-green, for an improved machine for weaving figured work, fifteen guineas.

IN MECHANICS.

To Mr. George Smart, of Westminster bridge, for his machine for cleansing chimnies without the aid of climbing boys, class 133; the gold medal.

To Mr. Joseph Davis, 14, Crescent, Kingsland-road, for his machine for cleansing chimnies without the aid of climbing boys, class 134; the silver medal.

To Mr. Christopher Wilson, Richard-street, Commercial Road, for a secure sailing boat, or life-boat, the gold medal.

To Mr. F. C. Daniel, Wapping, for his apparatus to secure persons from sinking in water, or a life-preserver when shipwrecked, the gold medal.

To Mr. J. W. Boswell, Hatton-garden, for his method of preventing the surging of a cable, the gold medal.

To Mr. William Hardy, St. John-street, Clerkenwell, for equalizing the long and short arcs of vibration in timekeepers, the silver medal.

To Mr. Henry Ward, of Blandford, Dorsetshire, for a compensation pendulum, the silver medal.

To Mr. S. Mendham, Counter-street, Borough, for a watch escapement, the silver medal.

To Mr. J. Broad, Downing-street, for his guage, or measure for timber, the silver medal.

To Mr. A. Stass, 18, Porter-street, Newport-market, for a machine for closing boots in a standing posture, the silver medal.

To Mr. Gilbert Gilpin, Old Park Iron Works, near Shiffnall, for his machine for raising coals or other articles from mines, twenty guineas.

To Mr. Charles Le Caan, of Llanelly, in Wales, for improved tram plates for carriages on rail roads, twenty guineas.

To Mr. Joseph Collier, 11, Crown-street, Soho, for an iron stove for ship use, or domestic purposes, fifteen guineas.

To Mr. Richard Drew, Great Ormond-sreet, for a balance level for land to be irrigated, ten guineas.

To Mr. Martin Furniss, Strand, for a new air-tight door hinge, ten guineas.

To Mr. Joseph Davis, 14, Crescent, Kingsland road, for securing window pannels and door pannels from being cut out by housebreakers, ten guineas.

COLONIES AND TRADE.

To William Bond, Esq. of Canada, North America, for useful information relative to improvements in Canada, the silver medal.

The number of Members elected since October, 1806, *is* 142.

The List of Premiums offered may be had, *gratis,* at the Society's House in the Adelphi;

By Order of the Society,

June, 1807. CHARLES TAYLOR, M. D. Secretary.

C. WHITTINGHAM, Printer, 103, Goswell Street.

RULES AND ORDERS

OF THE

SOCIETY.

DECEMBER 30*th*, 1807.

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RULES AND ORDERS.

SECT. I.

Of the Officers, and Manner of their Election.

I. THERE shall be One President, Sixteen Vice-Presidents, Two Chairmen to each of the standing Committees of the Society, a Secretary, an Assistant Secretary, a Housekeeper, and a Collector of the subscription money; which officers shall be elected, by ballot, on the twenty-second day of March, annually; unless when that day happens on a Sunday, or Good Friday, or Public Fast-day, in any of which cases the election to be on the following day; and on that day no other business of the Society shall be transacted.

II. In order to this election, the President, one of the Vice-Presidents, or, in their absence, some other member appointed by the majority, shall take the chair at eleven of the clock in the forenoon; two ballotting glasses, marked A. and B., shall be placed before the chair, the one for receiving the balloting lists marked (A.), and the other for receiving the ballotting lists marked (B.), and stand open for receiving lists until two of the clock in the afternoon: at which hour the ballot shall be closed, when three scrutineers to each ballotting glass shall be nominated

by the President, or presiding member, to examine the lists; but, in case not more than five members shall attend to vote on that day, the officers of the preceding year shall be continued till the next general election. That at the beginning of every election of a President, Vice-President, or Vice-Presidents, Chairman or Chairmen, the presiding member shall begin by calling over the names of the persons proposed as candidate or candidates for that election, in order that it may be known whether such candidate or candidates be in arrear.

III. A sufficient number of printed ballotting lists of all the officers in being, according to the forms annexed (A. B.) shall be ready; in which if any member chooses an alteration, he is to strike his pen across the printed name or names of such as he disapproves, and write on the blank side the name or names of such as he would substitute in their place.

IV. Each member shall deliver his lists folded up to the President, or presiding member, to put into the glasses; and the collector, sitting on the side of the chair, with a list of the members before him, shall mark the name of each member so delivering in his lists.

V. When the ballot is closed, one of the scrutineers shall open and read aloud each list, and file it, while the other two or more mark the names; and when all the lists are drawn, the marking scrutineers shall cast up and report the same to the chair; after which, the President, Vice-President, or presiding member, shall declare the persons who have the majority of votes to be the officers respectively for the ensuing year.—Such election shall likewise be declared again at the next meeting of the Society.

VI. If the President, or any of the Vice-Presidents, shall

shall resign or die, the remaining Vice-Presidents shall continue to act and preside at the meetings of the Society, in the order they are placed in the election list, until the next annual meeting for the choice of officers, or some other general, or extraordinary general meeting, which the Society shall please to appoint for such particular election.

VII. If any of the officers of Secretary or Assistant Secretary, Housekeeper, or Collector, shall become vacant, a person shall be appointed, at the next meeting of the Society, to act in such respective office of Secretary, Assistant Secretary, Housekeeper, or Collector, until the next general meeting, or an extraordinary general meeting, which shall be appointed for electing a person by ballot, to fill the vacant office for the remaining part of the year.—In case the office of Secretary, Assistant Secretary, Housekeeper, or Collector, be at any time resigned, which resignation shall take place on a subsequent day: it shall be in the power of the Society to proceed to the election of a proper person to fill such office on such resignation taking place, or to nominate one to hold it *pro tempore*, until such office shall be filled up. But no person shall be entitled to ballot at the election of any of the said officers, in case of a vacancy by death, resignation, or removal, who shall not have been a member previous to the declaration of such vacancy, unless he shall become a perpetual member.

VIII. At all elections of officers, if the suffrages should be equal, the decision shall be by lots, prepared by the scrutineers, and drawn by the President, Vice-President, or presiding member.

IX. Notice of the annual, or of any occasional election of officers, shall be published three different days, in such

newspapers as the Society shall order, one week at least before the day of election.

X. Notwithstanding the election of officers is annual, the Society reserve to themselves the power of removing either their Secretary, Assistant Secretary, Housekeeper, or Collector, by two general or extraordinary general meetings; in which case the said officers shall be paid their salaries in such proportions as may be then due to them.

XI. Neither the Secretary, Assistant Secretary, the Housekeeper, nor the Collector of the Subscriptions, shall be members of this Society.

XII. No person, except he shall have been an officer the preceding year, shall be admitted as a candidate for any lucrative employment, without having personally presented his petition or memorial to the Society, sixteen days before the day of election; which petition or memorial shall be read immediately after the first, and again after the second reading of the minutes. "And in case of its being referred to "a committee to examine and report on the qualifications of "the candidates for any lucrative office, such committee shall "not enter on their examination of the candidates, until "within fourteen days of the day fixed for the election, (of "which meeting for examination notice shall be given to all "the candidates,) and they shall examine all the candidates "who attend for such purpose, in the order in which their "names occur in the alphabet." No member of this Society shall be eligible as a candidate for any lucrative employment in the gift of the Society, who shall be present, or act as a member, at any meeting or committee of the Society, after he has declared by word, message, or otherwise, his intention of becoming a candidate.

XIII. No officer who receives a salary, or servant, shall be

be entitled to any premium or bounty whatever from the Society.

XIV. No officer, or servant, shall presume under any pretence whatsoever, to accept of any present or gratuity from any candidate for a premium or bounty, or any tradesman having dealings with the Society, or any person coming to see the machines, on account of such premium, bounty, dealing, or inspection.

XV. No officer, servant, or person, employed to shew the machines in the several repositories, shall accept any gratuity from the maker or seller of any machines made after models or machines, for which the Society have adjudged any premium or bounty.

XVI. A Messenger shall be chosen or removed at any meeting of the Society; and so long as he continues in their service, he shall be paid a salary of seventy pounds a year.

SECT. II.

Duty of the President, Vice-Presidents, and Chairmen.

I. THE duty of the President, Vice-President, (in the order they appear in the list), or Chairman, is to preside at all meetings, with his hat on if he pleases, to regulate the debates of the Society; to state and put questions, both in the affirmative and negative, according to the sense and intention of the meeting; to check irregularities, and keep all persons in order; to direct summonses for all extraordinary general meetings; and to execute, or see to the execution, of all the rules and orders of the Society.

II. The President, or any one of the Vice-Presidents, shall sign receipts for the subscription money.

SECT. III.

Business of the Secretary.

I. HE shall attend all meetings and committees of the Society: he shall take down all minutes of the committees, and produce them fairly written, at the ensuing meetings. He shall read all the minutes of the meetings and committees to the Society; and translate such communications into English as shall be in any other language. He shall prepare all answers, when ordered by the Society, in such language as shall be directed, and lay the same before the Committee of Correspondence, for their examination, unless the Society shall judge an immediate answer necessary. He shall prepare an annual historical register of the Transactions of the Society, beginning every year from the first day of July, and ending the last day of June following. This register shall contain an account of all premiums bestowed, with the names of the persons who have received them, digested under proper heads; a list of the premiums offered by the Society, and upon what condition, and the number of members. He shall also prepare an account of the amount of annual and life subscriptions separately, the money in the Bank, and in the Collector's hands, as they shall have stood on the last day of June, and of other sums received during the preceding year; and what have been the expenses, in officers, servants, apartments, and workmen's and tradesmen's bills of all sorts. He shall prepare the list of members, advertisements, and other publications ordered by the Society; and take care that the same be properly and correctly printed: and his name, or that of the Assistant Secretary, as by order of the Society, shall be signed to all publications. All the letters or written papers of the Society shall be kept under

under his care, and ready to be produced by him for the inspection of the members. He shall visit manufactories, or apply to manufacturers for information, when required by the Society; and he shall, as much as possible, endeavour to make himself acquainted with the nature and circumstances of the several arts and manufactures of this and other countries.

II. The Secretary shall read the whole of the Eleventh Section of the Book of rules and Orders, at the time when the standing Committees are appointed to be declared in the Society; and also at the opening of the business in the general committee of election, ordered to be holden on the Friday following annually. And in consideration of his constant attendance, abilities, and diligence, he shall be paid a salary of two hundred and fifty pounds a year, and be supplied with coals and candles.

SECT. IV.

Business of the Assistant Secretary.

I. THE Assistant Secretary shall attend every day at the office of the Society from the hours of ten to two, during the sessions of the Society, and such further time as may be necessary to perform the business of the Society in his department, and at all meetings of the Society, and read the letters received. He shall likewise attend committees, when particularly ordered by the Society, or by one of the Chairmen of such Committees. He shall take down all minutes of the Society's proceedings, and produce them fairly written in the Minute book of the Society, at the ensuing meeting. He shall enter in the Reward book, under their proper classes, the rewards bestowed by the Society, and make indexes to all the Minute books, and to the Transactions of the Society intended for publication. He shall

shall paste all letters and papers in the Guard book. All the written books of the Society shall be kept in the Society's office for the inspection of the members. He shall transcribe all papers or letters that have been prepared by the Secretary or approved by the Society, or by the Committee of Correspondence and Papers. He shall together with the Secretary examine the proofs and revises of the Society's publications—And as a satisfaction for such services he shall be paid a salary of one hundred and twenty pounds a year.

II. Any member having obtained leave to take copies of the proceedings or papers of the Society, shall pay to the Assistant Secretary, for writing the same, after the rate of two-pence for every hundred words.

SECT. V.

Business of the Housekeeper.

I. THE Housekeeper shall have an apartment in the house of the Society, that she may be ready on the spot to receive messages, letters, and all matters brought to the Society; to answer all enquiries; and deliver plans, lists, &c. to such members as shall come or send for them, of which she shall take care to have a sufficient number. She shall have the custody and care of all the furniture, books, such papers as the Society shall think proper, and other effects whatever, belonging to the Society. She shall have the direction of all the inferior servants. She shall receive and have charge of all the matters sent to the Society by candidates for premiums, and shall enter them properly, at the time when delivered, in a book for that purpose. She shall keep a fair inventory of all the goods and effects of the Society, to be always ready when called for. She shall keep an account of all stationary ware, printed books, coals, candles,

candles, and all other particulars sent in by tradesmen for the use of the Society, in a Day-book for that purpose; and shall enter the same fairly, under their several heads, in another book, to be laid every month before the Committee of Accompts, as a check on tradesmen's bills. For all which services she shall be paid a salary of seventy pounds a year; and fifty pounds to pay the servants, for cleaning the rooms and furniture; and other incidental charges to which she is liable.

SECT. VI.

Business of the Collector.

I. THE Collector shall give such security as the Society shall require, for the trust reposed in him. He shall collect the subscription-money from the members, as it becomes due, paying all he collects into the Bank of England, in the names of the two chairmen of the Committee of Accompts for the time being. He shall attend all Committees of Accompts; and at every meeting of the Society he shall lay before them the Bank-Book, with an account of what money he has received, paid into the Bank, or remains in his hands. He shall keep the cash accompt of the Society, and draw out exact lists of the members, with the sums contributed by each, and arrears due. He shall deliver to the chairman of the Committee of Accompts, on the last day of January in every year, an account of the members who have paid in the preceding year, as likewise how many were elected, declined, or remained in arrear in that year. For all which services he shall be allowed one shilling in the pound, on all such contributions, but not on legacies and particular donations. He shall attend all meetings and committees of the Society, and inform them of all matters necessary for them

them to know; for which he shall receive thirty pounds a year.

II. And whereas a Collector, with whose conduct the Society may be well satisfied, may happen to be unavoidably prevented, through sickness or accident, from performing his duty, at a time when it may be prejudicial to the Society to have the collection delayed; or a Collector may have given such cause of dissatisfaction as to render his suspension expedient, and the time requisite for a proper examination into his conduct, before he may be either restored or justly removed, may occasion a prejudicial delay in the collection; the Society to obviate these inconveniences, reserve to themselves the power of suspending, in the latter case, a Collector at any ordinary meeting when twenty members at the least are present; and upon confirmation of such suspension, of appointing, in either of the said cases, a temporary Collector, which appointment shall not require confirmation.

SECT. VII.

Meetings of the Society.

I. THERE shall be five General Meetings every year, in the great room of the Society, at seven of the clock in the evening precisely, viz. on the first Wednesday in February, the third Wednesday in April, the second Wednesday in May, the second Wednesday in November, and the second Wednesday in December: At which meetings, or at any extraordinary general meetings only, if fifteen members at least are present, rules and orders for the government of the Society may be made and altered; and such rules, orders, and alterations, being approved

approved at the next succeeding general or extraordinary general meeting, shall be valid and binding.

II. An Extraordinary General Meeting may be called, if twenty members, at the least, are present, and the majority shall desire such extraordinary general meeting; which extraordinary general meeting shall be advertised three days successively in two of the daily papers: And if fifteen members are present they may proceed to business.

III. No proposition shall be offered to the Society, as matter of new rule and order, or which shall contain in it an alteration or amendment, of any established rule and order, unless delivered in by a member, ten days before a general meeting of the Society, to the Secretary, who shall immediately cause copies to be made of it, and to be hung up in the Society and Committee Rooms, containing the date of the ensuing General Meeting when the same is to be taken into consideration. At the next general meeting, the Secretary shall, immediately after reading the minutes of the preceding meeting, read all such propositions once over, according to the order they have been delivered in; which propositions shall be read a second time, with a proper pause after each; and if any of those propositions be moved and seconded, it shall then be taken into consideration.

IV. All new rules and orders, once passed, are to be hung up in the Society's room till they are confirmed, with the date when passed the first time, and when to be confirmed.

V. All new rules and orders shall be signed by the President or the Vice-President, and undersigned by the Secretary, and hung up in the Society-room and Committee-room, for the information of the members, till such time

as they are inserted in their proper places in the subsequent printed book of rules and orders.

VI. The ordinary Meetings of the Society shall be held on Wednesday in every week, at seven of the clock in the evening precisely, from the fourth Wednesday in October, to the first Wednesday in June; and from the first Wednesday in June to the fourth Wednesday in October there shall be no meeting of the Society, unless called by the President, or two Vice-Presidents, on extraordinary occasions; and proper notice given thereof in the daily papers: And if at such ordinary meetings there should be present eleven or more members, they may proceed on business; but, in case there should not be eleven members present at seven o'clock, they may proceed on business with nine members only. And the said meetings shall have power to appoint such committees as they think necessary.

VII. An extraordinary meeting, for the doing of common business only, may be at any time ordered by the Society, in the same method as an extraordinary general meeting.

SECT. VIII.

Order of the Proceedings of the Society.

I. THE book of Rules and Orders, List of Premiums and of Members, shall lie upon the table before the President, or presiding member, at all meetings; and before the Chairman at all committees.

II. Each member is at liberty, before the President, Vice-President, or presiding member, takes the chair, to deliver to the Secretary, in writing, the names of no more than two persons whom he desires to be admitted auditors at that

that meeting; which names the Secretary shall enter in a list, together with the name of the proposer. The list shall be read as soon as the chair is taken, and, if not objected to, the Collector shall carry the same to the Committee-room, and there call over the several names; when the persons allowed to be present may enter the great room, and seat themselves among the members, but shall not be permitted to debate or vote.

III. Persons desirous of being admitted auditors, are to remain in the Committee-room, until their names are called over by the Collector.

IV. No person to be admitted an auditor at any meeting of the Society, unless introduced by a member; nor shall any member propose an auditor to be admitted after the chair is taken.

V. No auditor to be admitted at the meetings of the Society but those who shall have obtained leave of the Society, or members of the Societies of the same kind in Scotland and Ireland.

VI. No member, whose subscription shall be beyond the current year in arrear, shall be at liberty to propose an auditor to be present at any meeting of the Society; and the Collector is directed to attend to this circumstance.

VII. At all meetings, business shall begin at seven o'clock in the evening, with reading the minutes of the preceding meeting: but no part of such minutes shall be discussed till the whole has been read through.

VIII. Candidates shall be ballotted for; and, during the ballot, the business of the evening shall be proceeded on.

IX. The minutes shall be read a second time; and no other matter shall be proposed till the said minutes have been discussed, article by article: and all parts of the minutes, which are not objected to at the second reading, shall stand confirmed.

X. The President, after the first, and also after the second reading of the minutes, is to declare, that every member is entitled to vote and assist in all the transactions of the Society and its Committees, unless his first subscription shall not have been paid; and that no member shall speak more than once, on one and the same question, unless called upon from the chair to explain himself, excepting only the original proposer of any new motion, who shall be allowed the liberty of replying once on such occasion; and that no person is entitled to be present at any meeting or committee, whose subscription shall be at any time for two full years in arrear; and that no person shall be entitled to debate, or vote at any meeting or committee, until his subscription for the current year, and all arrears, are paid.

XI. Reports from committees shall be made; and the adjournment of those committees, which have not finished the business referred to them, shall be declared to the Society.

XII. All reports from the different committees shall be made to the Society in succession, according to their respective dates, unless when ordered otherwise by the Society.

XIII. A report from a committee, except in the case of a bounty, shall not be recommitted but by a majority of two thirds.

XIV. The report from the Committee of Accompts is to be made between the first and second reading of the minutes, the next Wednesday succeeding the audit.

XV. New

XV. New matter to be considered.

XVI. The president or presiding member, shall then read over to the Society the subjects the committees are to discuss the following days.

XVII. Letters to be read.

XVIII. No question shall be put on any motion, unless the motion be seconded.

XIX. No motion shall be permitted for the repealing any confirmed resolution of the Society, till such resolution has been in force three months; nor shall any motion that has been rejected be made again, till after three months from the time of its rejection.

XX. No new proposition shall be entered upon after ten of the clock at night.

XXI. No member, on any pretence whatsoever, shall be at liberty to move, that he may have leave to make a motion after ten of the clock.

XXII. No premium shall be offered to the public, unless it has been approved of by a committee, and agreed to by the Society, at one meeting, if the premium shall have been already published in the Society's transactions; or at two meetings of the Society, if it be a new premium: and no premium or bounty shall be given to any candidate, unless the Society, at two meetings, shall be satisfied that such candidate does really deserve the same.

XXIII. When any proposal is made for a premium or reward, and the motion made and seconded, it shall be delivered to the chair in writing, and the same shall be read twice.

XXIV. No motion shall be made for the dispensing with

any condition of a premium as offered in the advertisement, on any pretence whatever.

XXV. No motion shall be admitted to be made for the lending any of the machines of the Society, on any pretence whatever, excepting for inspection to the Board of Trade, the Solicitor and Attorney General, or some public body, by a special vote of the Society.

XXVI. No proposition shall be carried into execution till it is approved and confirmed by the Society at two subsequent meetings; but, if a negative be put upon an affirmative proposition, or a negative proposition be agreed to, such decisions shall not require confirmation. But this article only applies to ordinary meetings.

XXVII. If, at the second reading of a proposition, any alteration shall be made by way of amendment, such alteration shall not want the confirmation of another meeting, unless the Society shall increase a premium, bounty, or any other expense; in which case it shall require the confirmation of another meeting.

XXVIII. No member shall be permitted to be on the area or space between the tables, while the Society is proceeding on business; nor shall any member stand up within the seats, unless it be to speak, or to go from, or return to his place therein.

XXIX. When any member speaks he shall stand up and address himself to the chair, and the rest shall remain silent.

XXX. When two or more offer to speak together, the President, or presiding member, shall determine who shall speak first.

XXXI. The

XXXI. The member that speaks to order shall be first heard.

XXXII. When a matter is in debate, if any member speaks to new business, the President, or presiding member, shall interrupt him.

XXXIII. When on any question an equal number of hands appear to be held up for and against the same, the President, or presiding member, shall appoint two members to count and report the numbers to the chair.

XXXIV. In all meetings and committees, the President or presiding member, shall only vote when the suffrages are equal.

XXXV. The opinion of the Society shall be taken by ballot, instead of hands held up, if desired by five members.

XXXVI. A division shall not be granted but upon the request of six members.

XXXVII. No new matter, either respecting the government of the Society, or the measures for the improvement of arts, manufactures, and commerce, shall be received, unless it be laid before the Society in writing.

XXXVIII. At every meeting of the Society all the resolutions of such meeting shall be taken down at large, and read aloud by the Assistant Secretary immediately after they have been respectively agreed to.

XXXIX. No meeting shall be adjourned until the majority of the members present, upon the question being put and seconded, shall agree thereto; nor shall the question be put until the names of the candidates proposed at such meeting have been read.

SECT. IX.

Order of Proceedings at a General or an extraordinary General Meeting.

I. THE minutes of the preceding ordinary meeting shall be read.

II. The President, or presiding member, shall then declare the meeting to be a general or an extraordinary general meeting.

III. The minutes of the preceding general meeting shall be read the first time; and after a short pause shall be read a second time; when such parts as are not objected to shall stand confirmed.

IV. New matter relative to such meetings only may be proposed and discussed.

V. If, after a proper pause, no new matter is proposed, then the general or extraordinary general meeting shall be adjourned to the next general meeting in order; after which the usual business to go on.

VI. Every proposition that is to be discussed at a general meeting, shall be publicly read by the Secretary, on the preceding Wednesday, immediately after the second reading of the minutes, and usual declaration from the chair.

SECT. X.

Election of Members.

I. No person is to be proposed for a member, unless recommended by three members; and the name, place of abode, and addition of the person recommended, shall be delivered

delivered in, signed by the proposers, which shall be read by the Secretary, who shall insert the name in a list of candidates, to be hung up in the Society and anti-rooms, until the second following ordinary meeting of the Society, at which such persons shall be balloted for, provided there be fourteen days between the meetings: The names of the proposers, together with the name and addition of the person to be balloted for, shall be put upon the ticket, placed on the box, during the time of such ballot. The Collector, having a sufficient number of balls, shall give one to each, of the present balloting members, and, if two thirds of the members then voting shall ballot in his favour, he shall be deemed a perpetual member, upon payment of twenty guineas at one payment; or a subscribing member, upon payment of any sum, not less than two guineas annually (BB). Peers of the realm, and Lords of Parliament, desirous of becoming members of this Society, shall on their being proposed at any meeting of the Society, be immediately balloted for. Ladies are eligible as members of this Society; are entitled to attend and vote in its proceedings and committees, and are alone entitled to vote by proxy on elections only, through the medium of some gentleman who is a member, but such member must produce a written authority from the lady for whom he votes as proxy.

II. In election of members, a second ballot shall be granted, if immediately demanded.

III. Every person, upon his election, is to pay his subscription-money; or one of the members is at liberty to make the deposit, in his name, in case of absence.

IV. Every member shall pay his subscription-money in arrear within one month after he has been applied to by letter from the Collector for that purpose, according to the

copy annexed, (C); and no person shall be entitled to debate or vote, at any meeting or committee, until his subscription for the current year, and all arrears, are paid: And no person shall be entitled to be present at any meeting, or committee, whose subscription shall be at any time for two full years in arrear: Yet as several, who have declined continuing their subscriptions for a time, may be again desirous of becoming members, but by the foregoing rule and order seem to be precluded until their arrears shall be discharged, it is hereby ordered, that any such person shall be capable of being re-elected a member of the Society, in the same manner, and on the same terms, as if he had never been a member before.

V. When any person is elected a member, the Secretary shall immediately inform him thereof by a letter (D); and the Collector shall wait upon him, if in town, and carry a printed book of rules and orders, and the list of premiums.

VI. The names of such persons as have not paid their first subscription-money, are to be omitted in the list of members.

VII. Foreigners, or persons who do not reside in Great Britain, may be elected, by ballot, corresponding members of this Society, without being subject to any annual payment: and shall be admitted to the meetings and committees of the Society during their residence here, provided such residence does not exceed three months at one time; but shall not be permitted to vote.

VIII. On election of any person to be a corresponding member of this Society, a letter shall be written by the Secretary, acquainting him therewith; and the Secretary, in such letter, shall inclose him an exact copy of the standing rule and order, "That no member of this Society shall

"hereafter

" hereafter be a candidate for, or entitled to receive any pre-
" mium, bounty, or reward, except the honorary medals of
" the Society ;" and also, that the Society request their corresponding members, as often as shall be convenient, to favour them with accounts of such useful discoveries or improvements in any of the polite or economical arts, as may come to their knowledge.

SECT. XI.

Of Committees.

I. THE standing committees for the year shall be declared, and the members thereof shall be named by the Society, at eight o'clock, on the first Wednesday in March; and a general committee of election, to which the chairmen and members of the several committees shall be especially summoned, shall meet on the Friday next ensuing, to take into their consideration the choice of two chairmen to each of the several committees for the following year, and report their names to the Society on the second Wednesday in March, as proper persons to serve as chairmen in the respective committees, under the titles of which they shall be severally inserted, as follows :

Committee of Accompts.
Correspondence and Papers.
Agriculture.
Chemistry, Dyeing, and Mineralogy.
Polite and Liberal Arts.
Manufactures.
Mechanics.
British Colonies and Trade.
Miscellaneous Matters.

And

And they are to report and recommend them to the Society as proper persons to be elected at their annual election of officers, to be held on the twenty-second day of the same month.

II. Nine committee minute books are to be kept; one for each of the above-mentioned committees.

III. Two chairmen shall be elected by ballot, for the Committee of Accompts, committee for Miscellaneous Matters, committee of Correspondence and Papers, and each class of the Committee of Premiums severally; who shall preside for that year when present, in the order they are named; and in case neither of the said chairmen should be present at their respective committees, any other member shall be appointed by the committee, chairman for the occasion.

IV. Committees shall not take up any matter, unless referred to them by the Society.

V. All committees shall be summoned, and the matters referred to them shall be specified in the respective summonses, and when any matter is referred to any of the committees of this Society, the mover and seconder thereof shall be summoned to attend such committee when the same is taken into consideration.

VI. All committees shall have power to adjourn themselves as they think fit; and, notwithstanding particular gentlemen are named for each committee, every member is of every committee.

VII. If a member shall signify to the Secretary his intention to attend any committee, he shall be summoned to it; and the Secretary shall be directed to summon such other members and other persons as the chairman apprehends to be most conversant in the business to come before them; which

which business also shall be declared in the summons: And three members shall constitute a committee.

VIII. In order that every member may be the better informed of the times of the meetings of the several committees, in general cases they are fixed in the following manner:

Committees of Correspondence and Agriculture, on Monday.
Colonies and Trade, and Manufactures, on Tuesday.
Mechanics, on Thursday.
Polite Arts, on Friday.
Chemistry, on Saturday.
Accompts, in the first week in every month,

IX. It is the duty of a chairman to observe that no question be put to the committee, unless three members are present; and, before an adjournment of such committee, or report concluded, that the minutes be read, and signed by the chairman, who shall certify that three members at least were present. And the chairman is requested to attend the reports of the committee in which he presided, when such reports are made to the Society.

X. The chairman shall take care that regular meetings of the committee be appointed, and that their reports be made, fairly written and without blanks, so soon as any one or more of the subjects referred for their consideration have been disposed of; or when they may deem it requisite to gain further directions from the Society; but in case upon appointment of a committee, a sufficient number do not attend, the chairman is required to appoint another day, and shall direct the Secretary to summon the committee on a future day, at a distance of not less than three days inclusive.

XI. There shall be constantly hung up in the Society's room and committee-room, a list of all committees, specifying

fying the business they are to consider, and the days they are appointed to meet.

XII. No pecuniary or other reward shall be given to any candidate for a premium or bounty, for his trouble or attendance on any committee, to whom such matter shall be referred by the Society for their consideration, unless by order of the Society.

XIII. All references to the several committees shall be entered in the respective committee-books, in one list, at the beginning of such books, in order that the subjects of them may be regularly taken up.

XIV. Lists of reports that are ready to be made, or standing for confirmation with their dates, shall always be hung up in the great room.

XV. Every committee shall direct the Secretary to write to one or more of the persons subscribing any certificate in claim of a premium in Great Britain, or to such other person as the committee may think proper, for a further information of the truth of such certificate, and shall wait for an answer as to the reality of their having signed the same, before the adjudication of such premium.

SECT. XII.

Of Rewards.

I. THE chief objects of the attention and encouragement of the Society, in the application of their rewards, are ingenuity in the several branches of the polite and liberal arts; useful inventions, discoveries, or improvements in agriculture, manufactures, mechanics, and chemistry; or the laying open any such to the public; and in general all such useful inventions, discoveries, or improvements, as

may

may appear to have a tendency to the advantage of trade and commerce.

II. The Society reserve to themselves the power of giving in all cases, such part only of any premium as the performance shall be judged to deserve, or reserving the whole if there be no merit.

III. The premiums of this Society shall extend to Great Britain and Ireland, and all the British Isles.

IV. No member of this Society shall be a candidate for, or entitle to receive, any premium, bounty, or reward whatsoever; except only the honorary medal of the Society. And no member having delivered in his claim for any premium offered by the Society and afterwards withdrawn the same, shall be entitled to take a part in the deliberations, or vote on the claims of other candidates who may have claimed such premium.

V. No member who is a candidate for the honorary premium or medal of this Society, shall be of the committee to which such matter may be referred; or ever present at their sittings, while the subject is under consideration, unless called in to answer such questions as the committee may propose: nor shall any such candidate be present in the Society when the matter is before them, whether in debate, or for determination, unless called in. Which rules, all members being such candidates, are strictly to observe, under penalty of forfeiting their title to such medal, notwithstanding any determination of the Society in their favour.

VI. If any member shall be afterwards found to have transgressed the rules mentioned in the preceding resolutions, by the means of a borrowed or fictitious name, such member shall be expelled the Society.

VII. No.

VII. No member, who is the father, son, or master of a candidate for a premium, bounty, or reward, nor any person any-wise lucratively interested in such an event, shall be of the committee to which such matter is referred; nor present in the Society when it is under consideration, unless called in, under penalty of excluding such child, father, scholar, apprentice, or servant, from all title to any such premium, bounty, or reward, notwithstanding a determination of the Society in their favour.

VIII. A candidate for a premium, or person applying for a bounty, being detected in any disingenuous methods to impose on the Society, shall forfeit any such premium or bounty, and be deemed incapable of obtaining any for the future.

IX. No candidate who is not a member, shall be present at any of the meetings of the Society or committees, or admitted at the Society's rooms, after they have delivered in their claims, till such claims are adjudged, unless summoned by the committee, under forfeiture of the premium or bounty, for which they are candidates.

X. No machine or model of a machine shall be admitted to claim a premium, unless the whole and every part thereof, shall be delivered into the Society's office at or before the time appointed by the Society. And, if any candidate shall secretly make addition to, or alteration in his machine or model, otherwise than by repairing and putting the several parts together, after it is lodged with the Society, he shall on discovery be deemed incapable of receiving any premium.

XI. The Society shall, whenever they think proper, desire the assistance of such gentlemen, manufacturers, or others, though not members of it, as shall be deemed best

able

able to judge of, and discover the truth and value of any matter or thing for which a premium has been claimed.

XII. No medal or sum of money, shall be given as a bounty or reward for any thing not mentioned in the list of premiums at any time, unless fifteen members are present; and the majority to bestow such medal or sum of money, shall consist of two-thirds at least of the members then present; the same to be confirmed by ballot.

XIII. If a claim for a premium shall be rejected by the Society, no motion shall be made for giving to the candidate, in lieu of such premium, any bounty of equal honour or value with the premium offered.

XIV. Every person who shall receive any premium or bounty from the Society, shall relinquish all pretensions to a patent for any matter for which he has obtained such premium or bounty. No model or machine, for which a patent has been obtained, or is proposed to be obtained, shall be admitted into the repository of the Society.

XV. No member who has obtained a patent for any article similar to such as may be produced to the Society, shall be allowed to vote either in the committee or Society on that subject.

XVI. If any reward be conditionally voted by the Society, and the imposed conditions be not completed within one year from the time of such vote, the reward is to be considered as void, unless further time shall be granted by the Society for complying with the said conditions, in consequence of an application in writing made by or from the said claimant.

XVII. The several candidates and claimants to whom the Society shall adjudge premiums or bounties, are to attend at the Society's House, in the Adelphi, on the last Tuesday in

in May of that session, at eleven in the morning precisely, to receive the same; that day being appointed by the Society for the Distribution of their Rewards: and before that time no premium or bounty will be delivered, except to those who are about to leave the kingdom.

In cases where the Society may think fit to admit excuses for not attending in person, deputies may be substituted to receive the rewards, provided such deputies are either members of the Society, or superior officers thereof.

SECT. XIII.

Resolutions.

I. THAT all models of machines, for which persons obtain premiums or bounties, shall become the property of the Society, and correct written descriptions be furnished with them, and where machines are rewarded, that complete models or correct drawings, and proper written explanations, be delivered to the Society by the persons entitled to such rewards.

II. All the written accounts, for which any premium is offered and given, or for which the Society have given a bounty, shall be published; such accounts being first referred to a committee to prepare them for publication.

III. With the list of premiums, an account of all the medals, premiums, and bounties, which have been given by the Society the preceding year, to whom and for what purposes, shall be printed annually.

IV. In the list of the members, after the name of each member, his addition and place of abode are to be inserted.

V. The committee of correspondence are at liberty from time to time, to refer such letters as they esteem

proper

proper to the respective committees, without reporting them to the Society, in order to be referred to such committee; except such as propose the granting any new premium or bounty.

VI. All the books of the proceedings, correspondence, &c. of the Society, shall be kept in the Society's office to be inspected by members at any reasonable hour; the Housekeeper having for that end a key to the presses.

VII. Members wishing to obtain copies of papers belonging to the Society, shall give a list of such papers as they want, which lists shall be read by the Secretary.

VIII. That no book be purchased for the library of the Society, until it has been recommended by the committee most competent to judge of its merits and usefulness.

IX. No member is to be permitted to borrow from the library more than either one folio, one quarto, or two octavo or 12mo. volumes at one time; but that this liberty shall not be construed to extend to the Transactions of literary and other politic bodies, lexicons, or dictionaries, which shall on no account be lent out of the library.

No member is to be permitted to keep any book longer than fourteen days.

A book is to be provided by the Housekeeper in which the titles of the books borrowed with the name of the person borrowing the same, shall be inserted by the member who borrows such books, and when they are returned, countersigned by the Housekeeper.

That such book of the housekeeper be laid before the chairman of the Miscellaneous Committee at every meeting thereof, in order that it may be seen that the above regulations be properly attended to.

X. No person shall be permitted to make any sketches, finished drawings, or paintings, from any statues, busts, casts, drawings, prints or pictures in the Society's possession, without leave first obtained from the Society.

XI. That the Society do not, under the notion of varnishing, touching, or on any account whatever, suffer any painter to meddle with the series of pictures in the great room.

XII. That for the better regulation of the dealings of the Society with tradesmen and others, all persons having any claims on the Society, be in future directed to send in an account of their demands once in every three months from the time of their accruing; and the committee of accounts shall at their next monthly meeting inspect such demands, and report upon them to the Society, when the bills recommended for payment, upon such recommendation being confirmed by the Society, shall be discharged at the ensuing monthly meeting of that committee, by the drafts of either of the chairmen on the Bank, countersigned by the Secretary: and that the Bank be strictly enjoined not to pay any draft which shall not be countersigned.

N. B. To persons inclinable to leave a sum of money to this Society by will, the following form is offered for that purpose:

ITEM, I give and bequeath unto A B, and C D, the sum of upon condition, and to the intent, that they or one of them, do pay the same to the collector, for the time being, of a Society in London, who now call

call themselves *The Society for the Encouragement of Arts, Manufactures, and Commerce*; which said sum of

I will and desire may be paid out of my personal estate, and applied towards carrying on the laudable designs of the said Society.

BALLOTING LIST.

(A) PRESENT OFFICERS.

PRESIDENT.

Charles, Duke of Norfolk, F. R. and A. S.

VICE-PRESIDENTS.

Wm. Henry, Duke of Portland, F. R. and A. S.
Hugh, Duke of Northumberland, F. R. and A. S.
Jacob, Earl of Radnor, F. R. and A. S.
Charles, Earl of Liverpool, L. L. D.
Charles, Earl of Romney, F. R. S.
George, Earl of Dartmouth, K. G. and F. R. S.
Hon. Robert Clifford, F. R. and A. S.
Sir William Dolben, Bart. L. L. D.
Sir Robert Peel, Bart. M. P.
Sir Watkin Lewes, Knt.
Thomas Pitt, Esq. F. A. S.
Caleb Whitefoord, Esq. F. R. and A. S.
Richard Clark, Esq. Chamberlain.
Nathaniel Conant, Esq.
Richard Powell, M. D.
Thomas Rowcroft, Esq. Alderman.

SECRETARY, Charles Taylor, M. D.
ASSISTANT SECRETARY, Mr. Thomas Woodfall.
HOUSEKEEPER, Miss A. B. Cockings.
COLLECTOR, Mr. S. T. Borman.

PRESIDENT.

VICE-PRESIDENTS.

SECRETARY.
ASSISTANT SECRETARY.
HOUSEKEEPER.
COLLECTOR

[56]

PAPERS referred to.

(B) BALLOTING LIST.

PRESENT CHAIRMEN.

Committtee of Accompts.	Committee of Accompts.
Correspondence and Papers.	Correspondence and Papers.
Polite Arts.	Polite Arts.
Agriculture.	Agriculture.
Manufactures.	Manufactures.
Mechanics.	Mechanics.
Chemistry	Chemistry.
Colonies and Trade.	Colonies and Trade.
Miscellaneous Matters.	Miscellaneous Matters.

(BB)

No. 18

RECEIVED of
the sum of being his
contribution to the *Society for the Encouragement of Arts, Manufactures, and Commerce*, for one year from

£. VICE-PRESIDENT.

No. 18

RECEIVED of
the sum of being his
life contribution to the *Society for the Encouragement of Arts, Manufactures, and Commerce.*

£. VICE-PRESIDENT.

SIR, (C)

I AM directed to inform you, that your annual subscription of has been in arrear since the day of and as it is of consequence for the Society to know what sums of money they can bestow in premiums, you are requested to order the payment of it.

By order of the Society,

COLLECTOR.

SIR, (D)

I HAVE the honour to acquaint you, that on this day you were elected a Member of the *Society for the Encouragement of Arts, Manufactures, and Commerce*; and as, by their Rules and Orders, every person on his election is to pay his subscription-money, and is not confirmed a member till such subscription be paid, you are requested to order the said payment to be made to the Collector,

I am, Sir, your very humble Servant,

ADELPHI, SECRETARY.
Dec. 30th, 1807.

Printed by Order,
CHARLES TAYLOR, SECRETARY.

PRINTED BY R. WILKS, 89, CHANCERY-LANE.

PAPERS

IN

AGRICULTURE.

The THANKS *of the Society were this Session voted to the Right Hon. the* EARL OF FIFE, *for the following Communication received from him relative to his Plantations.*

SIR,

I REQUEST you will lay this letter before the Society for the Encouragement of Arts, &c. as I feel it my duty to convey any information to them, respecting my plantations from the grateful sense of the honour they have done me. I have continued every year since I last wrote to the Society, to plant above one hundred acres: my plantations now, in the counties of Banff, Aberdeen, and Murray, amount to above thirteen thousand acres. I have always recommended to planters to be very sparing in pruning trees.

I have the pleasure to observe, that on the highest grounds in Duff-House Park, even where exposed to the sea, by cutting down firs and other trees, where they interfere with

each other, that the oaks and other close-grained timber trees, rise vigorous and healthy, and will be very valuable, the oaks in particular. The silver fir and larch also grow to a great size. I was under the necessity of cutting down two silver firs and larches, where they prevented the growth of other trees; I directed them to be sawed up.—The boards of the larch have been made into tables, and are very handsome. Those of the silver fir have been used as flooring to two rooms in Delgany Castle, where the fir had decayed, and are remarkably white and finely polished. The trees in question were about forty years old.

There was a very high wind the 25th of December last, which blew down a great many trees upon my estate. Particularly a silver fir in the woods on the low grounds near Duff-House, which appeared to be well sheltered. It was planted by me in the year 1756, and had a most venerable appearance. The dimensions were as follow, as attested to me, viz.

	Ft.	In.
Length of the trunk from the surface of the ground, until divided in five limbs - - -	7	0
Girth at surface of ground - -	9	7
Girth immediately below where the limbs set off - -	8	6
The five limbs are all of the same height, except No. 1, which divides into two branches before it reaches the top. These are only a few inches shorter than the others, which are 42 feet 6 inches from where they leave the trunk, whose length is 7 feet, therefore, when added together to the height of the tree, is - - - -	49	6
No. 1. Measure of girth, where it sets off from the trunk -	5	3
And at the distance of 8 feet divides itself into two large branches.		
No. 2. Girth where it sets off from the trunk -	4	0
And at the distance of 23 feet 4 inches from starting, measures 2 feet.		
No. 3. Girth at starting - - - -	3	10

This,

This, and the two other branches, No. 4 and 5, gradually decrease towards the top.	Ft.	In.
No. 4. Girth at starting from trunk - -	3	7
No. 5. Girth at ditto ditto - - - -	3	3

The tree alluded to has a great deal of wood in it, which I have ordered to be manufactured for different purposes. There are pineaster larger, but their wood I conceive not to be so fine. The other trees are thriving and well-fenced. Little trouble is occasioned by keeping the fences in repair. I do not recommend the planting of acorns, but rather procure them from nurseries, at two or three years old.

I think seedling larch thrives best when planted in moors, and this also thins the seed beds, from which so many may be taken and transplanted into nurseries, and planted out the second year after.

I raise very few Scotch firs, as I buy them from nurserymen, at ten-pence per 1200. I continue to have nurseries of all the different hard woods, near my plantations, and which I find answer better than what are purchased from nurserymen. In general they are planted too near each other in their nurseries, and not being removed in time, the roots are seldom so good, which I think I have stated in my former letters.

I am, Sir,

Your most obedient humble servant,

FIFE.

London, Fife-house, 28th June, 1807.

To C. Taylor, M. D.

Secretary to the Society of Arts, &c.

The SILVER MEDAL *of the Society was this Session voted to* DAVID DAY, *Esq. of West-hill, near Rochester, for his Plantations of Ash Trees, and his interesting Remarks on the Advantages derived from them.*

IN the first volume of the Society's Transactions for 1783, page 109, will be found a detailed account of the experiments which Mr. Day had made to the years 1779 and 1780 in planting Ash trees; the present account points out their subsequent management.

Mr. Day has deposited with the Society a minute account of the expenses to which the following statements refer, and which may be inspected at the Society's house.

SIR,

IF you think the following information, relative to my plantations of ash trees, likely to be of advantage to the public, I wish you to lay it before the Society of Arts, &c. The Rewards I received from the Society have stimulated me to exertions in this line, and I have been very successful. I have declined all business but that of raising ash trees for my own amusement, and for improvement of the landed interest; and I flatter myself that I know it as well as any man in the kingdom. I am so certain of the success attending ash plantations, that I am willing, on landed security being given me, to advance any sum as far as thirty thousand pounds, on having the execution of such improvements under my own inspection, either jointly, or on the owner's account. I have travelled over a considerable part of England, and was sorry to see such a waste tract of land

as

as Bagshot Heath, when I know it might be improved by cultivation or planting, as has really been done at Farnham, and many other commons in the kingdom. Where there are, at present, wild or uncultivated woods, I would recommend to grub up the old wood, and either put the land in tillage, or plant it properly with fresh wood, which would produce four times as much both in timber and underwood.

I have made from the underwood of some of my plantations 94*l.* per acre, at only ten years growth, and I am now falling some plantations, of which the underwood alone will produce me 150*l.* per acre, exclusive of the expense of falling. It cannot be expected that noblemen or gentlemen, brought up in expectation of possessing large estates, can have a knowledge of improvements like the executive man, and they are deterred from them by the impositions they meet with in attempting their execution. Few servants will exert themselves properly in improvements without having an interest in it themselves: But my plan is no speculation; I know from long experience it will yield an ample profit to the persons who engage in it with attention. When the plantations are once put in order, they require but little to be done afterwards, and, therefore, are good estates for parents to give their female children, as the wood will always find its value from the buyers, when ready for falling, without any trouble or expense to the owner.

I am, Sir,

Your obedient servant,

DAVID DAY.

West-hill, near Rochester, April 23, 1806.

To C. TAYLOR, M. D. SEC.

ACCOUNT of two acres of land in the parish of Chalk, planted with Ash, in the year 1763.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1766	33	0	0	By produce in 1776	42	0	0
Expenses to 1793	53	19	1	By ditto in 1783	40	0	0
Balance of profit in 1793	135	1	6	By ditto in 1793	107	0	9
£.	189	0	9	£.	189	0	9

N. B. In 1806, *the above Plantation was again fallen, and the Produce sold for* 50*l. per Acre, but it was worth considerably more. The Shoots are now in a very flourishing state.* [July, 1807.]

Account of two acres of land in Maggot's Wood.

Expenses to 1780	28	16	0	By produce in 1780	54	8	0
Expenses to 1792	30	0	0	By ditto in 1792	100	0	0
Expenses to 1799	22	3	8	By ditto in 1799	180	13	0
Balance of Profit in 1799	254	1	4				
£.	335	1	0	£.	335	1	0

N. B. It is now eight Years since the last Fall, and the Crop of Ash, in its present state, is worth 90*l. per Acre.*

Account of one and a half acre of land next Brompton Farm, in the parish of Frindsbury.

Expenses to 1783	4	16	3	By produce in 1783	42	8	0
Rent for 9 Years	10	16	0				
Expenses to 1794	20	19	0	By produce in 1794	115	19	6
Balance of profit in 1794	121	16	3				
£.	158	7	6	£.	158	7	6

N. B.

N. B. In 1806, *was again fallen, and the Produce sold for* 50*l. per Acre, and the present Crop in an excellent state.*

Account of seven acres of land, at Longfield, in the parish of Higham.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1784	9	6	9	By produce in 1784	£. 130	1	6
To ten years rent	32	0	0				
Balance of profit in 1784	98	14	9				
	£. 130	1	6				

N. B. This Land has not been in my Hands since 1798, *and is now in a neglected state from bad Management, and from the Fences being broken down, and the Plants damaged by Cattle.*

Account of six acres of land at Stonefield, in the parish of Frindsbury, planted with Ash and Chesnut trees.

Expenses to 1790	4	19	0	By produce in 1790	44	3	9
To rent 14 years	67	4	0				
Expenses to 1799	55	19	0	By produce in 1799	140	5	0
Balance of profit in 1799	56	6	9				
	£. 184	8	9		£. 184	8	9

N. B. This Land has not since been in my Hands; the Chesnuts are now in a flourishing state, but the Ash much neglected.

Account of six and a half acres of land at Frenchill, in the parish of Shorn—planted 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1786	9	7	5	By produce in 1786	91	9	6
To rent for 9 years	46	16	0	By produce in 1799	163	2	0
Expenses to 1799	90	6	3				
Balance of profit in 1799	108	1	10				
	£. 254	11	6		£. 254	11	6

N. B. This Land is in my Possession, and the Crop in its present state is worth 50*l. per Acre.*

Account of a quarter of an acre of land in the parish of Shorn—planted with Ash.

Expenses to 1786	1	0	6	By produce in 1786	8	13	6
To nine years rent	1	11	6				
Expenses to 1801	10	6	10	By produce in 1801	31	16	6
Balance of profit in 1801	27	11	2				
	£. 40	10	0		£. 40	10	0

N. B. In four Years time this Crop will be worth considerably more than the last falling.

Account of five acres of land at Commonfield, in the parish of Shorn—planted with Ash in 1777.

Expenses to 1788	10	11	2	By produce in 1788	165	0	6
To 11 years rent	44	0	0				
Expenses to 1800	90	2	2	By produce in 1800	480	15	5
Balance of profit in 1800	501	2	7				
	£. 645	15	11		£. 645	15	11

N. B.

N. B. In three Years time, this Crop will be worth more than the last fall.

Account of a quarter of an acre of land, called Pompfield, in the parish of Shorn—planted with Ash in 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses & rent to 1789	2	0	1	By produce in 1789	8	10	6
Expenses to 1801	10	1	6	By produce in 1801	23	14	6
Balance of profit in 1801	19	14	5				
£.	32	5	0	£.	32	5	0

N. B. In four Years the Produce will be worth more than the last Crop.

Account of eleven acres of land, called Piper's Acre, in the parish of Higham.

Expenses to 1790	44	13	9	Produce in 1790	72	1	0
Expenses to 1799	94	15	4	Produce in 1799	123	16	10
Balance of profits in 1799	56	8	9				
£.	195	17	10	£.	195	17	10

N. B. This Land is in the Hands of a Farmer as a Tenant, and the Plants are much damaged from the Cattle being permitted to graze amongst them.

Account of two acres of land, called Seven Yards, in the parish of Higham—planted with Ash in 1780.

Expenses to 1790	7	7	9	Produce in 1790	£. 31	7	0
Balance of profit in 1790	23	19	3				
£.	31	7	0				

N. B.

N. B. This Land is not in my Hands; it afforded an excellent Crop in 1799, *and the Plants are now in a very flourishing state.*

Account of two acres of land, called Gad's Hill, in the parish of Shorn—planted in 1777.

Dr.	£.	s.	d.	Cr.	£.	s.	d.
Expenses to 1802	48	16	4	Produce in 1802	108	15	3
Balance of profit in 1802	59	18	11				
£.	108	15	3				

N. B. The present Crop is in a very flourishing condition.

Account of three quarters of an acre near my garden, in the parish of Frindsbury—planted with Ash in 1770.

Expenses to 1780	4	0	0	Produce in 1780	22	12	0
Rent ten years	6	0	0	Produce in 1798	71	14	6
Expenses to 1798	10	18	5				
Balance of profit in 1798	73	8	1				
£.	94	6	6	£.	94	6	6

N. B. July 1807. *This Crop will next Year produce more money than the former Crop.*

Account of total profits on forty-six acres one rod of land, referred to in the above statement.

Acres.	Rods.						
2	0	at Chalk	from 1763 to 1793	135	1	8
2	0	Maggots	from 1769 to 1799	254	1	4
1	2	Brompton	from 1774 to 1794	121	6	3
		Carried forward	£.	510	9	3

Acres.

Acres.	Rods.		Brought up	£.		
			Brought up	510	9	3
7	0	Longfield	from 1774 to 1784	88	14	9
6	0	Stonefield	from 1776 to 1799	56	6	9
6	2	French-hill	from 1777 to 1799	108	1	10
0	1	Robins's	from 1777 to 1801	27	11	2
5	0	Commonfield	from 1777 to 1800	501	2	7
0	1	Pompfield	from 1777 to 1801	19	4	5
11	0	Piper's Acre	from 1780 to 1799	56	8	9
2	0	Seven Acres	from 1780 to 1790	23	19	3
2	0	Gad's Hill	from 1777 to 1802	59	18	11
0	3	Near Garden	from 1770 to 1798	73	8	1
			£.	1525	5	9

SIR,

AGREEABLY to your request that I would furnish you with some further particulars, relative to my Ash plantations at the present period; you will find that I have added to each a N. B. with the state at the present day. I now send you some further remarks as you desired, relative to my mode of sowing the seed and managing the young plants.

Method of raising Ash Trees.

I carefully procure, from good straight well-proportioned ash trees, the ash keys, as they are commonly called, or pods, containing the seed, betwixt Christmas and the middle of February. Having, as soon as the ash keys are collected, prepared a hole in the ground, about three or four feet deep, I lay a bed of sand, a few inches deep, at the bottom of the hole; upon that I place a layer of ash keys, about two inches thick; these I cover with sand about the same thickness, to preserve the keys from heating,

ing, and then proceed with alternate layers of the keys and sand till the hole is full. They are suffered to remain in this state till the beginning of the month of March of the following year, when they should be taken out for sowing. The keys will be found in a swelled state, ready for vegetation. The land being properly prepared, drills should be made in it as for sowing peas, and the keys laid regularly therein, and covered up with earth.

In about six weeks the young plants will appear above ground, and should be kept perfectly clear from weeds by hoeing.

In the month of March, of the next year, they should be planted out in rows, a foot wide, and the plants placed three or four inches asunder in the row. In this state they are to remain for two or three years, when they will be in a proper condition for planting out into the land, where they are to remain.

For planting out where they are to remain, the land being previously well ploughed the preceding autumn, and a good loamy soil, not too wet or stiff, the ground is to be opened by the plough, into drills about two feet apart, and the plants placed in each other drill or row, so that the rows of ash are four feet apart, and the plants in the drill two feet asunder. The drills should be 10 or 12 inches deep. A man who sets the plants, places each upright in the drill, draws the earth to it with his foot, and treads it well in. Where a plant with a larger root than common is found, the man with a small hoe or picker makes a hole within the drill, a little deeper than usual, to hold the plant, but this is not often necessary.

A statute acre will contain 5400 ash plants, and one man can plant 1000 or 1200 plants in a day.

The intermediate row between the plants may be either

set

set with beans or potatoes, or may be left open advantageously to serve as a drain to keep the young plants dry.

In the second year the plants should be stubbed or cut close to the ground with a bill; the produce serves for bavins or fire wood, and pays the expense of rent and cutting. From the stubs thus left in the ground the regular crops of ash are produced, and are fit for falling every ten years.

The ash plants are usually fallen betwixt Christmas and March, and the wood sorted into poles of three denominations; viz. best, second, and third hop-poles; besides stakes, edders, and bavins. The bavins will amply pay the expense of falling. The best hop-poles are worth, at present, forty shillings per hundred, the second quality twenty-five shillings, and the third, ten shillings. Stakes and edders are about two shillings and sixpence the hundred.

When the plants remain uncut for twelve or fourteen years, the ash plants are fit for other purposes, such as wood proper for wheelwrights, and broad hoops for coopers, besides hop-poles, &c. as before-mentioned.

When the plants have been two years in the nursery beds, and ready for planting out, they are worth from six shillings to ten shillings the hundred, according to their quality.

The ash plants I raised from 1763 to 1778, were	442484
I raised and sold from 1778 to 1807 .	156320
I have now ready for sale . . .	126096
Total of the plants I have raised	724900

I will engage, provided the land is prepared by my directions, to plant ash for one-third less money than by any other mode of cultivation yet known, and for all plants that die

die in such a case, provided they are in new plantations, I will give plants gratis to replace them the succeeding year.

I am, Sir,
Your obedient servant,

DAVID DAY.

West-hill, near Rochester, July 31, 1807.

To C. TAYLOR, M. D. SEC.

The THANKS *of the Society were presented to Dr.* JAMES HOWISON, *for the following Communication on the Chinese Method of propagating* FRUIT TREES *by Abscission.*

The following Accounts were received from him, and an explanatory Engraving of the Method is annexed.

SIR,

THE Chinese, in place of raising fruit trees from seeds or from grafts, as is the custom in Europe, have adopted the following method of increasing them.

They select a tree of that species which they wish to propagate, and fix upon such a branch as will least hurt or disfigure the tree by its removal.

Round this branch, and as near as they can conveniently to its junction with the trunk, they wind a rope, made of straw, besmeared with cow dung, until a ball is formed, five or six times the diameter of the branch. This is intended as a bed into which the young roots may shoot. Having performed this part of the operation, they immediately under the ball divide the bark down to the wood, for nearly two-thirds of the circumference of the branch. A cocoa-nut shell or small pot is then hung over the ball, with

Mr. I. Broad's Timber Gauge.

Chinese Method of propagating Fruit Trees by Absasion.

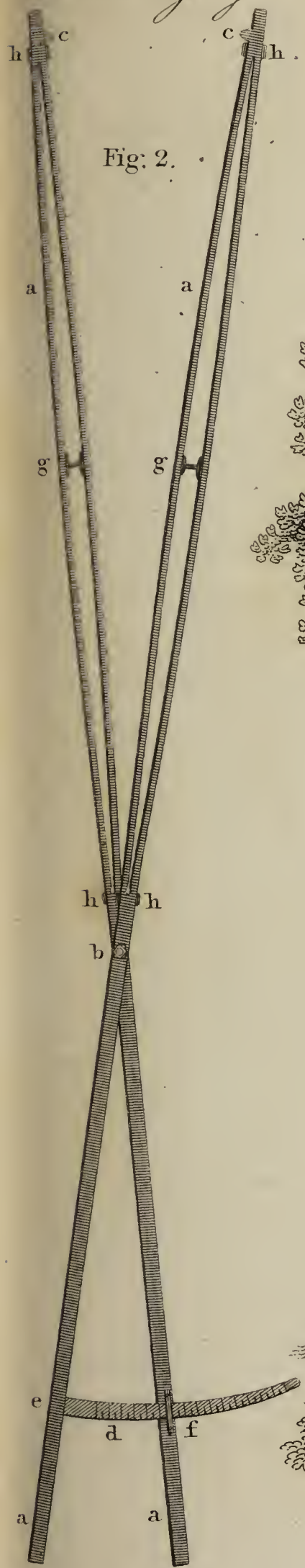


Fig: 2.

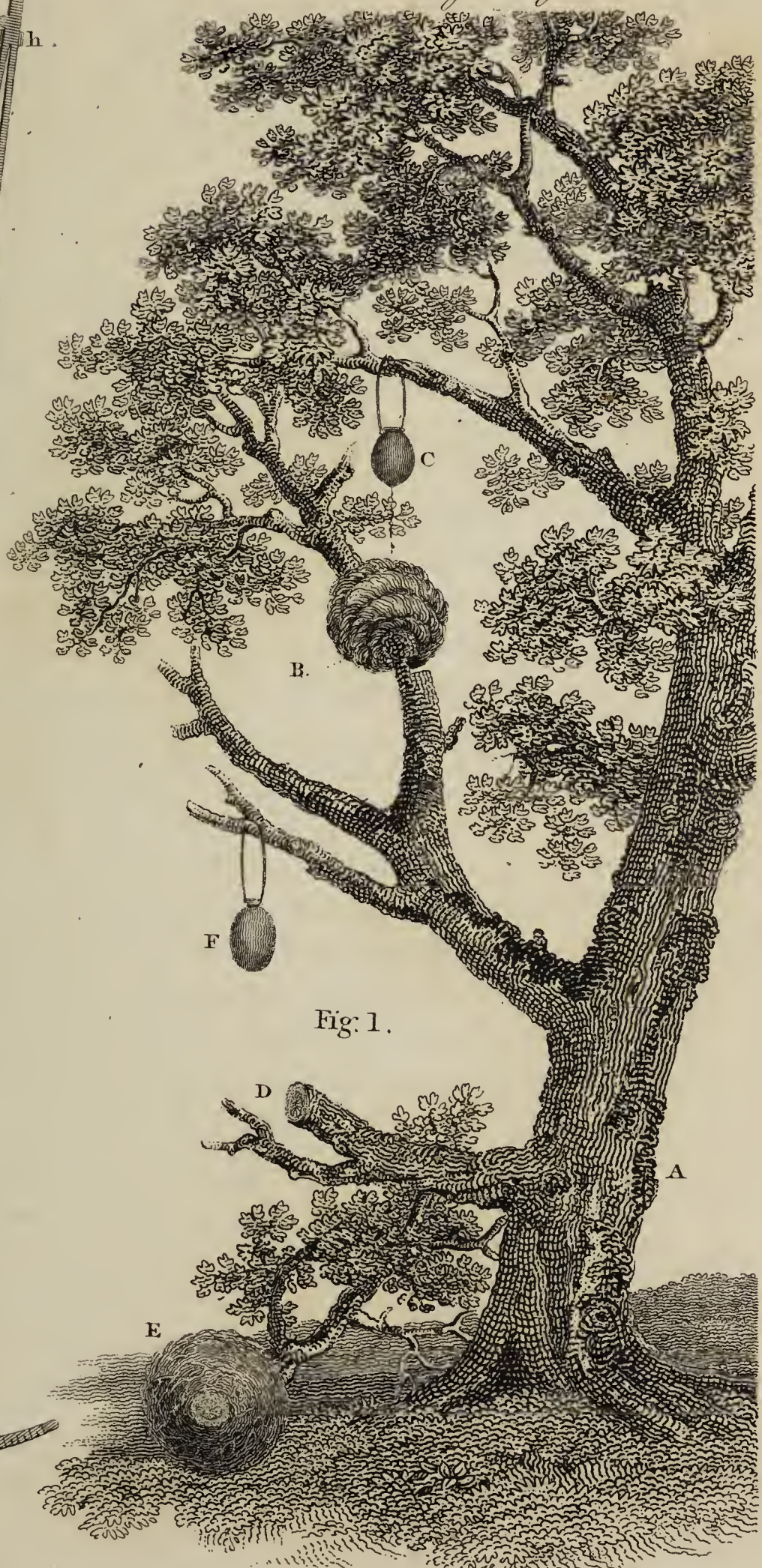


Fig: 1.

C. Varley del.

Miss M. Ogilvy del.

S Porter sculp.

with a hole in its bottom, so small that water put therein will only fall in drops; by this the rope is constantly kept moist, a circumstance necessary to the easy admission of the young roots, and to the supply of nourishment to the branch from this new channel.

During three succeeding weeks, nothing further is required, except supplying the vessels with water. At the expiration of that period one-third of the remaining bark is cut, and the former incision is carried considerably deeper into the wood, as by this time it is expected that some roots have struck into the rope, and are giving their assistance in support of the branch.

After a similar period the same operation is repeated, and in about two months from the commencement of the process, the roots may generally be seen intersecting each other on the surface of the ball, which is a sign that they are sufficiently advanced to admit of the separation of the branch from the tree. This is best done by sawing it off at the incision, care being taken that the rope, which by this time is nearly rotten, is not shaken off by the motion. The branch is then planted as a young tree.

It appears probable, that to succeed with this operation in Europe, a longer period would be necessary, vegetation being much slower in Europe than in India, the chief field of my experiments. I am, however, of opinion, from some trials which I have lately made on cherry trees, that an additional month would be adequate to make up for the deficiency of climate.

The advantages to be derived from this method are, that a further growth of three or four years is sufficient, when the branches are of any considerable size, to bring them to their full bearing state, whereas, even in India, eight or ten

years

years are necessary with most kinds of fruit trees, if raised from the seed.

When at Prince of Wales's Island, I had an opportunity of seeing this proved by experiment. Some orange trees had been raised by a gentleman, from seeds sown in 1786, which had not borne fruit in 1795, while branches taken off by the Chinese mode in 1791, had produced two plentiful crops.

Whether forest trees might be propagated in Europe in the same manner, I have not had experience sufficient to form a judgment: if it should be found practicable, the advantages from it would be great, as the infancy of trees would, by this means, be done away, a period which, from the slowness of their growth, and the accidents to which they are liable, is the most discouraging to planters.

The adoption of this method will, at all events, be of great use in multiplying such plants as are natives of warmer climates, the seeds of which do not arrive here at sufficient maturity to render them prolific.

I have frequently remarked that such branches of fruit trees as were under the operation of abscission, during the time of bearing, were more laden with fruit than any other part of the tree. It appeared to me probable, that this arose from a plethora or fulness, occasioned by the communication between the trunk and branches, through the descending vessels being cut off by the division of the back, while that by the ligneous circles or ascending vessels, being deeper seated, remains*. The same reasoning accounts for fruit trees producing a greater crop than usual, on being stripped of their leaves, most of the ascending juices being

* The circumstances attending the Chinese method of propagating fruit trees, appear a strong confirmation of Mr. Bonnet's opinion, that plants as well as animals have a regular circulation of their fluids.

thrown

thrown off by them in perspiration, or expended in their nourishment, for we find that bleeding trees cease to give out their juices after they have put forth their leaves *.

I have observed that the roots from a branch under the operation of abscission, were uniformly much longer in shooting into the rope when the tree was in leaf, than the contrary, hence, the spring season appears most proper for performing that operation.

It will seem singular that the Chinese entertain the same opinion that Linnæus did, respecting the pith of trees being essential to the formation of the seed. By cutting into the trunk of the guava tree before it has produced, and making a division in the pith, they have obtained fruit without seed.

I am, Sir,

Your obedient Servant,

JAMES HOWISON.

London, June 4, 1806.

To CHARLES TAYLOR, M. D. SEC.

Reference to the Engraving, Plate I, *Fig.* 1, *of the Chinese Method of propagating Fruit Trees by Abscission.*

A. The tree on which the operation is performed.

B. The straw rope wound in a ball round a branch of the tree.

C. The cocoa-nut shell or vessel, containing the water, which gradually drops from thence on the ball below it.

* Marsden, in his History of Sumatra, page 119, says, "The natives, when they would force a tree that is backward to produce fruit, strip it of its leaves, by which means the nutritive juices are reserved for that importan use, and the blossoms soon show themselves in abundance.

D. Another branch of the same tree from which the part E roosted in the straw rope or ball, and now ready for planting out, has been separated.

F. The vessel suspended from a branch above, and from which the ball had been supplied with water.

The SILVER MEDAL *was this Session voted to Mr.* JAMES BROAD, *of Downing Street, for his Invention of a Gauge or Measure for Timber.*

The following Communication was received from him; an Engraving of the Instrument is annexed, and a Model thereof is placed in the Society's Repository.

SIR,

THE Instrument I send herewith, is for finding the girth of standing timber, and will, I flatter myself, be found exceedingly useful to all gentlemen, and others having timber to dispose of, and likewise to such purchasers as wish to pay for the true quantity. At present a gentleman having timber to dispose of, is liable to be imposed on to a very large amount, for though some surveyors may be found whose eye is pretty accurate, yet that is far from being generally the case. When an estate is sold on which the timber is to be valued, I believe, there is no other way in general use of finding the girth of a tree (which being squared and multiplied by its length, gives the contents) than by actually getting up to the middle, where the girth is usually taken, with a ladder or otherwise: a method which is very troublesome and expensive where the quantity is large. The seller has, therefore, no way, but at an enormous expense, of finding the real contents of what he has

to

to offer, and as the buyer, if a dealer from his knowledge, is able to form a more accurate judgment, it often happens that the seller sustains much loss. *I have known it exceed 50 per cent.* Having some time ago a large quantity to survey, I thought it possible to invent an instrument which would obviate this inconvenience, and which might be sold at a low price, be correct in its work, quick in execution, and such as any capacity might use. I likewise thought it might be so contrived as to make such an allowance for bark, as should be agreed on. The instrument I send you possesses all these qualifications, and is susceptible of several improvements, of which I was not aware when I made it, which I will point out at the end of my letter.

It is well known that the diameter and circumference of circles, are in a certain proportion to each other, and that double the diameter gives double the circumference. The allowance for bark is usually one inch in thirteen, that is, if the greater circumference of a tree with the bark on, is found to be thirteen inches, it is supposed it would be only 12 inches if the bark was taken off.

The instrument is composed of two straight pieces of well seasoned deal, about thirteen feet long, joined together by a pin going through them, on which they are moveable, but neither the length nor thickness are of any particular consequence, as by following the directions hereafter given, they may be made of any size. A little way from the larger end is a brass limb, I call the index, on which are engraven figures denoting the quarter-girth in feet and inches. To use this instrument, it is only necessary to take hold of the large end, and apply the other to that part of the tree where you wish to know the girth, opening it so wide as just to touch at the same time both sides of it, without straining it, keeping the graduated side of the index uppermost, on

which the greater girth will be shown, after allowing for the bark, by the inner edge of the brass on the right hand leg. An operation so easy and simple, that a person of the meanest capacity might measure a great number of trees in a day.

For taking the height of a tree, I would recommend deal rods of seven feet long, made so as to fit into ferrils at the end of each other, tapering all the way in the same manner as a fishing rod. A set of five of them with feet marked on them, would enable a man quickly to measure a tree of more than forty feet high, as he would be able to reach himself about seven feet.

The improvements it is capable of, are, making a joint in the arch or scale, to enable it to shut up (when the legs are closed) towards the centre, which would make it easier to carry. Secondly, as it sometimes happens that standing timber is sold without any allowance for bark, and at other times with a less allowance than one inch in thirteen, two other scales on the index might be added in such cases, one without any allowance, and the other to allow as might be agreed on. I would have added these, but thought the Society would rather see it in the state in which it has been tried on a large survey, as any artist can with great ease add whatever scale he pleases. The present scale allows one inch in thirteen for bark, and is calculated on the following data. The diameter of a circle whose quarter circumference is 26 inches, is 33 $\frac{90}{100}$ inches. The diameter of a circle whose quarter girth is $6\frac{1}{2}$ inches, is 8 $\frac{27}{100}$ inches. To graduate the scale, the instrument is opened so as to take in at the small end between the touching points 8 $\frac{27}{100}$ inches, and a mark is made on the arch to denote 6 inches quarter girth: it is then opened so as to take in 33 $\frac{96}{100}$ inches, and another mark is then made on the arch, to denote two feet quarter girth;

girth; (these marks are made close to the inner edge of the brass on the right hand limb): the space between them is then divided into eighteen parts, which represent inches, and are again divided into half, for half inches; if any notice is to be taken of quarter inches, the eye will easily make a further decision.

I beg leave to add, that it is not my intention to make any for sale.

I am, Sir,
Your obedient Servant,
JAMES BROAD.

Reference to the Engraving of Mr. James Broad's Machine for measuring standing Timber. Plate I, *Fig.* 2.

Fig. 2. *a a a a* Two long pieces of well-seasoned wood, joined near the middle by a pin *b* going through them, forming an axis on which they move. *c c* Two pieces of brass screwed near their upper ends, on the sides opposite to each other, and projecting over to form the measuring points. *d* The index fastened to one of the pieces of wood at *e*, and moving freely under a small bar at *f*. *g g* Screws with nuts, placed in the middle of the long slits of the two arms, to wedge them open, whereby the vibration is destroyed, and the arms, though light, are rendered stiff. *h h h h* Screws and nuts to prevent the arms from splitting.

No. 12, *Downing Street, Dec.* 8, 1806.
To Charles Taylor, M. D. Sec.

A Certificate from Mr. J. Wilkins, carpenter, of Sandy Lane, dated May 4, 1805, stated, that he had used the instrument invented by Mr. J. Broad, for measuring timber standing, and that he believes it to be a correct and valuable one.

The Sum of TEN GUINEAS *was this Session voted to Mr.* RICHARD DREW, *of Great Ormond Street, for a* BALANCE LEVEL, *useful for laying out Land for Irrigation, for Roads, and other Purposes.*

The following Communication was received from him; an Engraving is annexed, and the Instrument is placed in the Society's Repository.

SIR,

HEREWITH you will receive a Balance Level, of my invention, which I have satisfactorily used on several gentlemen's estates in Devonshire, where I have been employed to drain and carry water to irrigate meadow land. I have made several for persons in that county, whose employment is to drain and irrigate land, and they have found it to answer their purpose better than the spirit or water level, it being more portable and ready to the sight.

I have lately used it on Mr. Satterley's farm, at Hastings, to carry the water of his closes over several acres of dry ground. Dr. De Salis, who has seen it, advised me to send it to the Society of Arts, &c. that they might judge of its merits.

I am, Sir,

Your obedient Servant,

RICHARD DREW.

London, Dec. 5, 1804.

To the Secretary of the Society
of Arts, &c.

Explanation

Explanation of the Method of using the Instrument.

Set it on a triangular staff, and point it at the object staff, which is held by another person at a distance; move the level on the joint, until the inner tube plays clear within the outer tube. Look through the sights, and observe the object staff which the person holds, let him move the slide on the staff until you see the hair cut the middle of the slide, on which there is a black line, then turn the level round, and look through the sights, you will then see if the hair cuts the middle of the slide as before, which, if it does, it will be level, but if there be a difference in both ends, the person who holds the staff must set the slide to half that difference. You are then to adjust the level by turning with a key the screw which moves the balance contained in the bottom of the inner tube.

Certificates from Mr. J. W. Gooch, Mr. Charles Layton, and Mr. Benj. Holmes, testify that they have seen in use the level invented by Mr. Richard Drew, and that the business is done by it with accuracy and dispatch.

Reference to the Engraving of Mr. Richard Drew's Balance Level. Plate II, *Fig.* 1, 2, 3, 4.

Fig. 1. The balance level, mounted on a ball and socket joint, with a tube, *a*, to fix on a stand.

Fig. 2. A section, *b b c c* two tubes of tin which slide on a short tube, *d d*, placed in the middle, and having an iron wire soldered round it to stiffen it, and to serve as a shoulder.

e e Two eye pieces, with glass in both, one at each end, and sliding into the tubes *b* and *c*.

f f The balance level, hanging by a sort of staple *g*, on a point fixed upright on the middle of the bar *h* (shown in Fig. 3), which is fastened across the tube *d*.

i i Two eye pieces sliding into the ends of the level *f f*, and having a narrow slit horizontally across the middle, with a hair before each, shown by the dots *h h*.

k An adjusting screw, which acts by drawing the piece *m*, (which moves in a dove-tail slide), in one end of the tube.

n The key-hole through which the screw is turned.

Fig. 4. An end view of the case and level, showing the eye pieces *i* and *e*, one within the other.

The SILVER MEDAL *of the Society was this Session voted to Mrs.* HANNAH D'OYLEY, *of Sion Hill, near Northallerton, Yorkshire, for a new Method of rearing Poultry to Advantage.*

ENGRAVINGS *of the Apparatus are annexed, and the following Accounts were received from her.*

SIR,

I BEG leave to communicate a most desirable method of rearing poultry, which I have proved by experience; the economy and facility with which it may be performed, would, if generally adopted, lower the price of butchers' meat, and thereby be of essential benefit to the community at large. I keep a large stock of poultry, which are regularly fed in a morning upon steamed potatoes chopped small, and at noon they have barley; they are in high condition, tractable, and lay a very great quantity of eggs.

In

In the poultry yard is a small building, similar to a pigeon cote, for the hens to lay in, with frames covered with net to slide before each nest; the house is dry, light, and well ventilated, kept free from dirt by having the nests and walls white-washed two or three times a year, and the floor covered once a week with fresh ashes: when I wish to procure chickens, I take the opportunity of setting many hens together, confining each to her respective nest; a boy attends morning and evening to let any off that appear restless, and to see that they return to their proper places: when they hatch, the chickens are taken away, and a second lot of eggs allowed them to set again, by which means they produce as numerous a brood as before: I put the chickens into long wicker cages, placed against a hot wall at the back of the kitchen fire, and within them have artificial mothers for the chickens to run under; they are made similar to those described by Monsieur Reaumur, in "his *Art de faire eclore et d'elever en toutes Saisons des Oiseaux domestiques de toutes especes*," &c. in two volumes, printed at Paris, 1751: they are made of boards about ten inches broad, and fifteen inches long, supported by two feet in the front, four inches in height, and by a board at the back two inches in height. The roof and back are lined with lamb's skins dressed with the wool upon them. The roof is thickly perforated with holes for the heated air to escape; they are formed without bottoms, and have a flannel curtain in front and at the ends for the chickens to run under, which they do apparently by instinct. The cages are kept perfectly dry and clean with sand or moss. The above is a proper size for fifty or sixty new hatched chickens, but as they increase in size, they of course require a larger mother. When they are a week old, and the weather fine, the boy carries them and their artificial mother to the grass-plot, nourishes and keeps

keeps them warm, by placing a long narrow tin vessel filled with hot water at the back of the mother, which will retain its heat for three hours, and is then renewed fresh from the steamer. In the evening they are driven into their cages, and resume their station at the hot wall, till they are nearly three weeks old, and able to go into a small room, appropriated to that purpose. The room is furnished with frames similar to the artificial mothers, placed round the floor, and with perches conveniently arranged for them to roost upon.

When I first attempted to bring up poultry in the above way, I lost immense numbers by too great heat and suffocation, owing to the roofs of the mothers not being sufficiently ventilated, and when that evil was remedied, I had another serious one to encounter; I found chickens brought up in this way did not thrive upon the food I gave them, and many of them died, till I thought of getting coarse barley-meal, and steaming it till quite soft: the boy feeds them with this and minced potatoes alternately; he is also employed rolling up pellets of dough, made of coarse wheat flour, which he throws to the chickens to excite them to eat, thereby causing them to grow surprisingly.

I was making the above experiments in the summer for about two months, and during that time my hens produced me upwards of five hundred chickens, four hundred of which I reared fit for the table or market. I used a great many made into pies for the family, and found them cheaper than butchers' meat. Were I situated in the neighbourhood of London, or any very populous place, I am confident I could make an immense profit, by rearing different kinds of poultry in the above method for the markets, and selling them on an average at the price of butchers' meat.

A young person of twelve or fourteen years of age, might bring up in a season some thousands, and by adopting a

fence

fence similar to the improved sheep-fold, almost any number might be cheaply reared, and with little trouble. Hens kept as mine are, and having the same conveniences, will readily set four times in a season, and by setting twice each time, they would produce at the lowest calculation, eighty chickens each, which would soon make them very plentiful.

If this information should be so fortunate as to merit the approbation of the Society, I shall consider myself highly honoured, and my time as having been usefully employed.

I am, Sir,

Your most obedient Servant,

HANNAH D'OYLEY.

Sionh-ill, near Northallerton, Nov. 28, 1806.

To Charles Taylor, M. D. Sec.

SIR,

According to your request, I have sent you a model of an artificial mother. The most convenient size for forty or fifty young chickens, is about fifteen inches long, ten deep, four high in front, and two at the back; it is placed in a long wicker cage against a warm wall, the heat at about eighty degrees of Fahrenheit's thermometer, till the chickens are a few days old, and used to the comfort of it, after which time they run under when they want rest, and acquire warmth by crowding together. I find it advisable to have two or three chickens among them of about a week old to teach them to peck and eat. The meat and water is given them in small troughs fixed to the outside of the cage, and a little is strewed along from the artificial mother, as a train

to

to the main deposit. It would have given me great pleasure to have been able to send a specimen of my superior feed and management, if the season had been rather more advanced, for I think it is not possible for turkies and chickens to weigh heavier, be whiter, or altogether better fed than mine are.

After a certain age, they are allowed their liberty, living chiefly on steamed potatoes, and being situated tolerably secure from the depredations of men and foxes, are permitted to roost in trees near the house.

I have the honour to be, Sir,

Your most obedient Servant,

HANNAH D'OYLEY.

Sion-hill, near Northallerton, May 11, 1807.

SIR,

ACCORDING to your request, I herewith send you a rough sketch of the apparatus I use, which probably will convey an idea of the business, and not be too complicated for persons employed in poultry yards, fully to understand; but to prevent trouble and prejudice in the first outset, I think it necessary to remark, that if the chickens do not readily run under the artificial mother for want of some educated ones to teach them, it will be proper to have the curtain in front made of rabbit or hare skin, with the fur side outwards, for the warmth and comfort to attract them, afterwards they run under the flannel ones, similar to the one I sent, which are preferable for common use, on account of cleanliness, and not being liable to get into the mouths of the chickens.

I have had great amusement in rearing poultry in the above way, and if my time was not occupied with my children

Mr. Richard Drew's Balance Level.

Fig: 2.

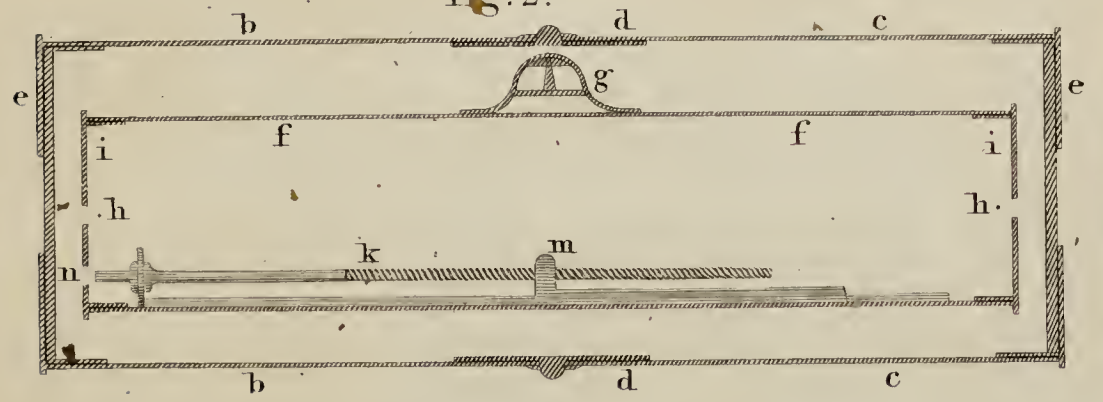


Fig: 1.

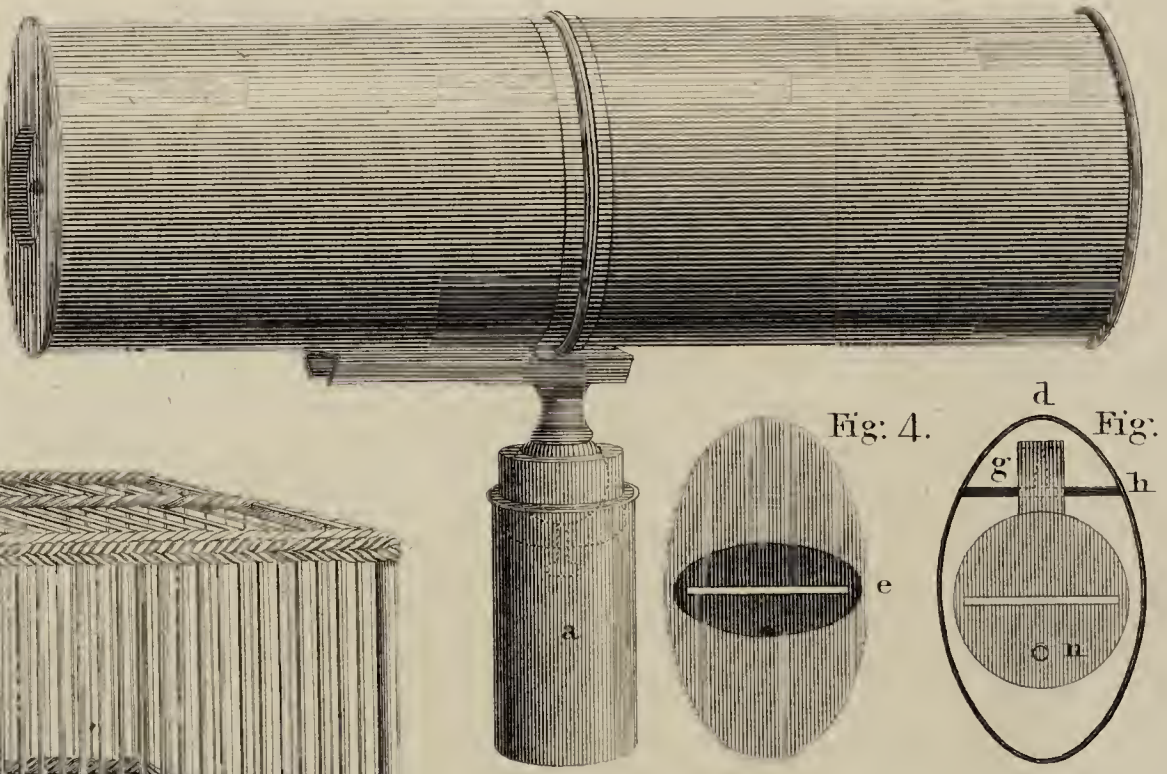


Fig: 4.

Fig: 3.

Fig: 7.

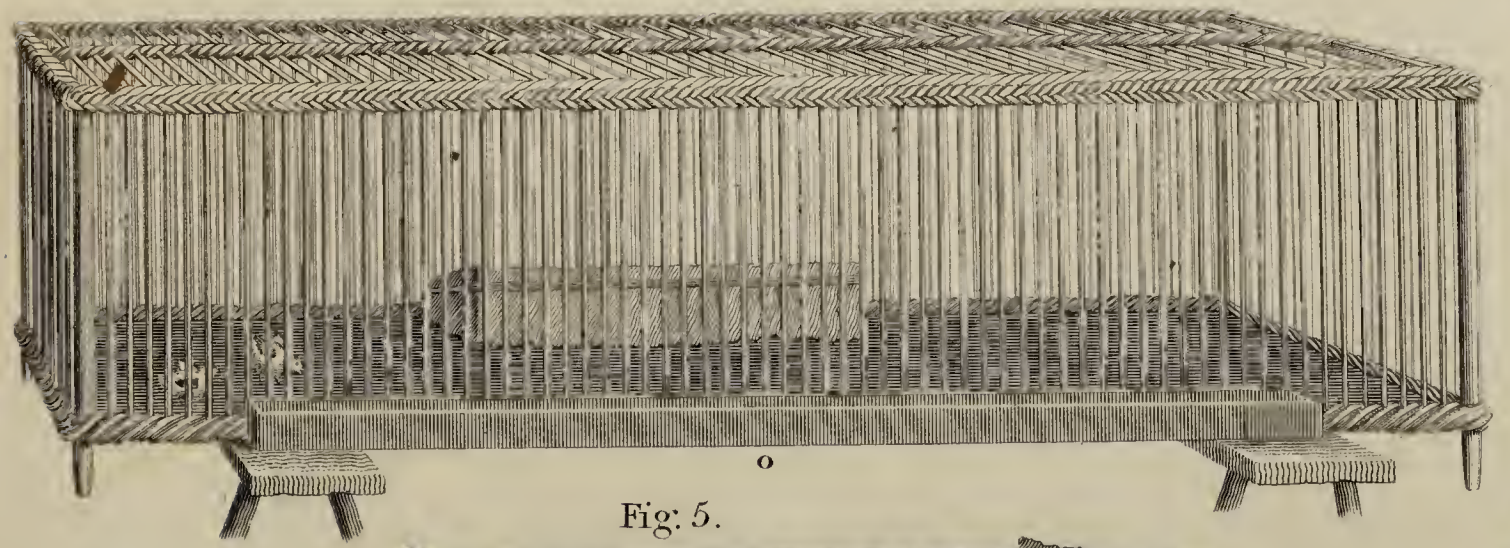


Fig: 5.

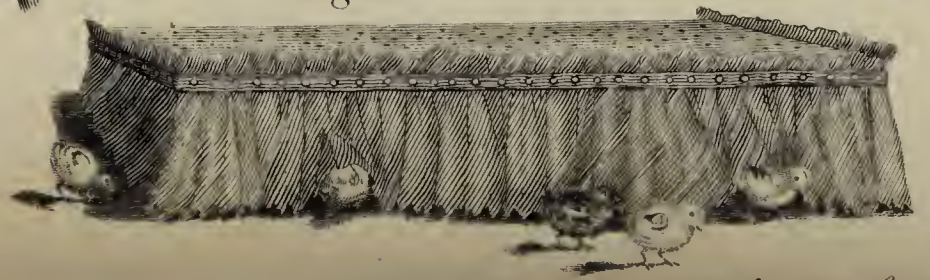
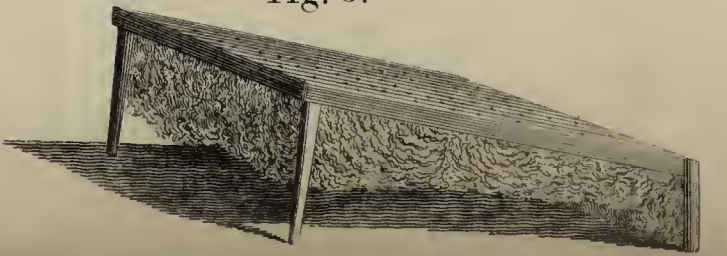


Fig: 6.



Mrs. D'Oyley's Method of rearing Poultry.

C. Varley del. S. Porter sculp.

dren and other family concerns, I should most assuredly farm very largely in poultry.

I have the honour to be, Sir,
Your most obedient Servant,
HANNAH D'OYLEY.

Sion-hill, May 20, 1807.

To Charles Taylor, M. D. Sec.

Reference to the Engravings *of Mrs. D'Oyley's Method of breeding Poultry.* Plate II. Fig. 5, 6, 7.

Fig. 5. The Apparatus called the Artificial Mother, with a curtain of green baize in front and ends, and holes through the top to allow the circulation of air.

Fig. 6. Another view of the artificial Mother, but without the curtain, in order to show its sloping direction, and interior lining of woolly sheep-skin.

Fig. 7. A wicker basket four feet long, two feet broad, and fourteen inches high, with a lid to open, and a wooden sliding bottom similar to a bird cage: the Artificial Mother is shown, as placed within it.

O. A Trough in front to hold food for the Chickens.

The Silver Medal *of the Society was this Session voted to Major* Spencer Cochrane, *of Muirfield House, near Haddington, North Britain, for the Culture of Spring Wheat, and the Use of Tincture of Opium in the Diseases of Cattle.*

On Spring Wheat.

SIR,

I request the favour that you will present my thanks to the Society of Arts, &c. for transmitting me the 20th volume of their Transactions, containing my former experiments

ments on the culture of wheat sown in the spring. I have since had further proofs of the advantage resulting from that practice.

Notwithstanding the extreme cold weather, which we had here during the months of March, April, and May, I never saw my spring wheat look better, particularly four acres, part of a field of strong clay, which I was prevented from sowing in October, when I sowed my other wheat, by wet weather commencing.

The whole field consists of twenty acres, and received one ploughing after drilled beans. I sowed on the 14th of March the four acres, with four bolls or two quarters of common wheat, on the same earth or furrow which the land got in the month of October.

In the event of land having been fallowed and sufficiently cleaned before winter, and wet weather setting in so as to prevent wheat being sown at the usual time, I recommend from experience that the wheat be sown in the spring on the winter furrow, and that it should by no means be ploughed again in the spring.

The winter frost meliorates the soil, and I think kills the annual weeds. I have remarked that by adopting this mode, the land is much less troubled with them, the weeds having been a general objection to spring wheat.

If spring wheat follows turnips, the ground should be ploughed as soon as possible, if the soil is of a wet nature, to correct the injury the land may have sustained by leading off the crop, and by the poaching of carts and horses. Frost will in some degree correct what should never if possible happen, *wet ploughing*.

From the middle of February till the 10th of March is the proper time for sowing wheat in the spring, provided the land is sufficiently dry. Then on the first furrow let the

seed

seed properly pickled be sown either by drill or broad cast, the usual practice of water furrowing, to keep the land from too much rain, being properly attended to.

On the Use of Tar for Cattle swelled by eating Clover.

Cows are frequently seized with violent swellings from having been imprudently allowed to eat clover when wet. A gentleman recommended to me, as a cure, an egg-shell full of tar, immediately to be put down the creature's throat. In two instances of my own cattle I found it had the effect of laying the swelling in a few minutes. A neighbour of mine whose cow was supposed could not live five minutes, was, on application of the tar, unexpectedly recovered, to the great joy of the poor man.

On Opium and other Preparations from Poppies.

After I commenced farmer, I unfortunately lost four horses, by a disorder, very frequent in this country, called the *bats* or *gripes*; some of them died in a few hours, and none of them were ill more than two days. For some years past I have given my horses in such cases a table spoonful of tincture of opium, or liquid laudanum, and have since lost none. If the first dose given in some liquid does not allay the violent pain and swelling, I administer a second spoonful, which I have hitherto, in all cases, found to have the desired effect, and generally in a very short time.

If I find the horse very hot and feverish, and sweating profusely, as is usually the case in this disease, I order him to be bled plentifully, and an ounce or more of nitre to be

mixed,

mixed, and administered with the laudanum, keeping the horse warm, and letting him be well rubbed round the belly.

A very considerable farmer near me, who has had a medical education, told me, a few days ago, that he had not lost a horse since he gave them laudanum.

Ten days ago I was equally fortunate in a trial of it on one of my sheep, which, half an hour after being washed with the rest of the flock, was taken so extremely ill, and swelled so much, that my herdsman supposed she could not live, having lost some of his own, which had apparently been in the same state. I immediately ordered half a handful of common salt to be dissolved in half an English pint of warm water, into which I put sixty drops of the laudanum, and poured it with difficulty down the animal's throat, which seemed nearly dead. For the first five minutes I had so little hopes of the sheep's recovery, that I ordered the man to get his knife ready to cut her throat; whilst he sharpened the instrument for such purpose, he observed the animal to move its jaw to a proper position, which had previously been much distorted; the eyes then began to quicken, and apparently to become at ease. In half an hour afterwards the sheep got on her legs, and remained standing for some time; a plentiful evacution soon took place, the swelling subsided, she continued to recover, and in a few hours from the first attack began to eat and do well.

My intent in these communications is to render generally public what I have found so very beneficial. At this time, when horses and cattle are so extremely high in price, every thing that can tend to preserve their lives, should be made known and put to trial.

I formerly noticed to you, that I had tried on a small scale, for several years, the culture of white poppies to prepare

prepare opium from them, and an extract or syrup of poppies; that I had raised a sufficient supply for myself and friends, and that my extract was equal in effect to any prepared from foreign opium. I recommend the poppy seeds to be sown in March, in drills.

Besides the advantages from the poppy heads as a medicine, the seeds yield a valuable oil. Two pounds of the seeds furnish by expression seven ounces of a pure bland oil, useful for portrait painting and other purposes. It has been proved in Holland to be equal in quality to fine salad or olive oil, and it would probably be advantageous to propagate largely so valuable a plant.

I am, Sir,
Your humble Servant,
SPENCER COCHRANE.

Muirfield House.

To C. Taylor, M. D. Sec.

SIR,

Since my former communication I have had frequent opportunities of being fully convinced of the efficacy of laudanum, when applied in proper time, for the cure of the cholic in horses. When inflammation has taken place, which sometimes comes on very rapidly, its application will be too late. A few days since two of my draught horses were taken ill, one in the morning, the other in the evening. I believe the disorder originated from their having been allowed to drink too much water when warm. By using the laudanum in the manner I have recommended they both recovered, and were at their work again within twenty-four hours. I grow the poppy, extract the opium from the heads, infuse it in spirits or brandy agreeably to the pre-

scription in the Dispensatory, and thus prepare the laudanum myself, instead of purchasing it at the apothecary's. I consider my opium to be pure and unadulterated, and of course stronger, and more efficacious.

I have cured many persons of colds and coughs of long standing, by the following preparation or syrup.

Take half a pound of the heads of the large white poppy without any of the seeds, the heads just ripe and moderately dried, put them into three quarts of boiling water, let them boil gently, till the liquor is reduced to one quart, squeeze the poppies well in a cloth to strain out the liquor, boil the liquor again slowly to one pint and strain it, then add to it a pint of white wine vinegar, and one pound of raw sugar, let them boil gently to the consistence of a syrup, then add thereto spirit or elixir of vitriol to make it gratefully acid. The dose I have recommended for adults is one or two tea-spoonfuls, but never exceeding three, on going to bed. If the cough continues violent, two more may be taken the following morning. One dose sometimes cures, two generally, and I have never had occasion to employ it more than thrice. For young children one tea-spoonful is sufficient.

I recommended the use of this medicine to a surgeon in Haddington, and he told me it answered beyond his expectation.

I am, Sir,

Your obedient Servant.

SPENCER COCHRANE.

Muirfield, near Haddington, May 7, 1807.

To C. Taylor, M. D. Sec.

PAPERS

IN

CHEMISTRY.

THE following Communications were received from the Right Hon. LORD RIBBLESDALE, of Gisburne Park, Yorkshire, respecting a mine of zinc ore, and his application of it as a paint; and although it did not appear, upon trial by various persons, fully to answer the purposes of white lead, as a basis for paint, yet it possessed sufficient merit to induce the Society to vote their SILVER MEDAL to his Lordship.

Samples of the zinc ore and paint are preserved in the Society's Repository.

SIR,

HEREWITH I send you a specimen of white paint, which for the sake of humanity, I trust will be found a complete substitute for that baneful article white lead.

I have used this paint for twelve years upon my house, paling, doors, &c. It is of a delicate stone tint, but be-

comes equal in colour by time to the best white lead, and for durability, for never blistering, and for body and adhesion infinitely superior to it.

If the specimen (which is the average of what may be ordinarily obtained, although for particular purposes it may be produced much finer), should meet with the approbation of the Society of Arts, &c. I shall at any time, with the greatest pleasure, at their request, render them all the information upon the subject in my power. I have painted four or five years ago a vessel which is now in his Majesty's service, with this paint, and nothing can exceed the resistance which this paint makes to all the effects of salt water to decompose it.

I have the honor to be, with much respect,

Sir,

Your obedient humble Servant,

RIBBLESDALE.

Clarges-Street, March 19, 1806.

To C. Taylor, M. D. Sec.

Additional Communication by Lord Ribblesdale, on his Ore of Zinc.

The mines are situated at Mallam Moors, in Craven, Yorkshire, and in an extent of country of eleven or twelve thousand acres of land belonging to his Lordship; where the mineral is found, there were formerly copper mines.

This article is found in caverns, about eight fathoms from the surface of the earth, the mineral lies in strata, along the bottoms of these caverns, which strata are from three

to

to six feet thick, and the best coloured mineral, or whitest, lies the lowest. On the upper part of the caverns are beautiful stalactites of great hardness.

One of the caverns wherein it is found is one hundred and four yards, another forty-four, and a third eighty-four yards in length, and about fourteen yards wide.

His Lordship supposes this mineral has been sublimed by a volcano, as the stones surrounding it have been vitrified.

The mineral was first tried as a paint twelve years ago; it was previously sold, and continues to be sold to make brass at Birmingham and other places. He has sold upwards of two thousand tons, at from five to ten pounds per ton, for making brass, when mixed with copper.

His Lordship stated, that it has answered well for house painting externally, and the whiteness improves by time; that it will in painting cover a much larger surface than white lead paint, and he supposes it will do half as much more work; that it forms a body on the wood so hard as to resist the edge of an adze; and that it forms a strong cement betwixt two boards painted with it.

That it will never peel off; that the oil paint on palings withstands the effect of moisture; and that it will mix as a basis with all other colours.

His Lordship added, that the price will not exceed that of white lead, but, on the contrary, thinks, that except in the finest preparations, upon an average it will come considerably lower.

March 29, 1806.

DEAR SIR,

PERMIT me again to assure the Society, that the body of my paint is equal to white lead, and that the ore itself is so pure, and is found in the mine so little mingled with any other substance, that I do not lose two pounds of the colour in a ton of the ore.

I remain, Dear Sir,
Your very humble servant,
RIBBLESDALE.

London Hotel, Albemarle-Street,
June 22d, 1807.

To C. TAYLOR, M. D. SEC.

TEN GUINEAS *were this Session voted to Mr.* EDMUND TURRELL, *No.* 40, *Rawstorne-Street, Goswell-Street Road, for his improved Mode of constructing Muffles for Chemical Purposes.*

The following Communications were received from him, and an Explanatory Engraving is annexed. Models of the Implements employed are placed in the Society's Repository.

MY LORDS AND GENTLEMEN,

HAVING experienced much inconvenience in the common mode of moulding muffles on wooden blocks, for the use of chemists, enamellers, &c. I beg leave to lay before your praise-worthy Society, an improved method, possessing the following advantages: namely,

First, By this new method of moulding muffles, coarser and cheaper materials may be used than can be employed in

in the common mode; and which also gives them the valuable property of resisting a greater degree of heat.

Secondly, That much time will be saved by this improved method of manufacturing them, must be allowed, when the two modes are compared.

Thirdly, The certainty of making them without cracks or flaws, and with coarser materials, will appear obvious, when it is considered, that by this improved method, they are *internally* moulded instead of *externally*; by which means the strength of the operator may have its full effect, in firmly compressing the composition into the mould.

Whereas, in the old mode, the workman, after having spread the composition upon a cloth, guessing at its thickness, bends it over the block in the best way he can, and by thus disturbing the composition, he must needs make many cracks and flaws, which can be but imperfectly closed in smoothing the surface of the muffle, whilst upon the block; the evil consequence attending which is, its being subject to fly or crack when exposed to a great heat; and it will also be plainly seen, that, in the old mode, a great disadvantage is felt by the sides of the muffle, whilst in its wet state, hanging from its centre, and which also tends to crack it, as there can be nothing applied to assist it in this case, but by employing a greater proportion of cohesive clay in the composition, which, however, produces little if any advantage; whereas in the mode which I have invented, this fault is entirely obviated, and the composition, by its contraction in drying, assists the extrication of the muffle from the mould.

Fourthly, With respect to simplicity, this new mode will be found to possess a very great advanta e, for a boy of twelve years of age may be taught to make them in a very short time.

The fifth advantage in this improvement, and of equal consideration, is the cheapness of the article; the price of which has been reduced nearly one-third to the consumer; and when the superior quality of them is taken into consideration, it may fairly be said to be full one-half. I mean, when regard is had to their superior quality; and that the muffles may be used over again when broken and ground, with a much less proportion of cohesive clay than in the old mode; and this I conceive to be no inconsiderable advantage; for it is well known, that when the old muffles or broken crucibles can be used without much fresh clay, they are far superior to new materials.

Sixthly, The muffles made in the old way are seldom of equal thickness; whereas those made according to the method which I have the honor to present before the Society, will be found to possess that necessary quality in perfection; for, if an hundred are made from the same mould, they will be all of the same thickness.

Description of the Moulds and Implements.

The first mould for this purpose is a tin one, Fig. 1, which may be made from a piece of tin the size of the arch, being bent so as to form such a concavity as may best suit the purpose to which it is to be applied; this being done, two square pieces of tin, *a a*, must have an arch cut out of them, of such a size that the diameter thereof may be about three-fourths of an inch less than the diameter of the concave piece before stated; these being soldered to each end of the first-mentioned piece, will form a stand for the hollow part of the mould, and the thickness of the muffle moulded in this will be exactly determined by the edge

at

at each end. A piece of hollow tin, *b b*, may be soldered along the top edge of the mould, to form a better resistance to the great pressure within. The next part of this mould is a flat piece of tin, Fig. 2, cut exactly to fit the inside of the mould, the use of which is, to form a solid back to the muffles used for chemical purposes.

The second tool for this purpose is a piece of sheet brass, Fig. 3, about six inches long and one broad, which being bent in a semicircular form, and screwed to a piece of wood extending beyond its breadth about an inch, is used for cutting the small air holes *c* (Fig. 11), in the aforesaid muffles.

The third is the tool or frame, Fig. 4, for preventing the contraction of the muffles in drying, which is made of four pieces of beech, about three quarters of an inch broad, and half an inch thick; the length must be adjusted to the mould of the muffle; two of these being laid parallel within the inside of the mould, and being joined across by the other two, the ends of which should extend so far beyond the outer edges of the other two, that they may rest upon the edges of the muffle mould, and thereby prevent its falling into the mould.

The fourth is the tool for spreading the composition into the moulds, which is formed of iron or steel, (Fig. 5), about thirteen inches in length, one inch and a half broad, and about one-eighth thick; its face under *h* being rounded in such a manner that its curve may exactly fit the inner curve of the muffle mould (Fig. 6, is a section of it); this should likewise have a point or tongue, extending from each end, long enough to be bent in the form of a bricklayer's trowel, and by the wooden handles which must be put on, hanging down, it will be found, that, as it is moved either backwards or forwards, it will always present an edge to smooth the composition, and condense it in the mould.

The

The fifth is a frame (*d d*), Fig. 15, of which the bottom and farthest side only are shown, and in which frame the tin mould, Fig. 1, is placed, simply constructed by joining two pieces of wood, the one as broad as the bottom of the muffle mould, and having two narrow groves (*e e*), cut in it, so that the edges of the tin mould may be confined therein; the other board being joined to this, at its edge, should come up so high as just to be under the edge of the mould.

The sixth is the tool for cutting the muffles of different lengths (Fig. 7), and is made of a piece of wood, to the end of which is fixed a thin piece of brass (*f*), which extending about one inch and one-fourth beyond the top of the wood, is bent at right angles, and made thinner at the end, that it may the more conveniently cut the muffle; under this piece of wood is used another straight piece (*g*), with two steady pins, which being shifted at the will of the workman, will cut them of any length.

The seventh is the mould for forming the bottom of the close muffle (Fig. 8), which is made of a mahogany or oak plank, about sixteen inches long, ten wide, and about three-eighths of an inch thick; upon this is fixed a ledge on each side, one inch broad, and nearly half an inch thick, and at each end a ledge of the same kind is placed, at such a distance as is best suited to the length of the bottom required. Fig. 9 and 10, are circular moulds for muffle bottoms of dial plates. Fig. 11, a complete muffle standing on its bottom. Fig. 12, a roller for rolling the composition in the first mould. Fig. 13, a tool for making small holes in the muffle.

The usual composition for making muffles is as follows: viz. two parts pipe clay and one part sand, such as is used by the bricklayers, sifted, and mixed together to a proper consistence; this is very expensive, on account of the high price

price of pipe clay, which is about ten shillings the hundred weight, whereas I employ in my improved mode of making them the coarser kind of Stourbridge clay, which can be had at the glass-houses, in the ground state, for six shillings the hundred weight, and this I sift also, to separate the finer part, which I employ for making other smaller articles necessary in my business; using only the grosser or coarser part for muffles, to which I add one-eighth part only of pipe clay, mixing them well together with water, so as to form a mass of a pretty thick consistence. The tin mould being first greased, I place it in the frame Fig. 15, shewn under Fig. 1. and having spread the composition in the mould, and smoothed it with the spreader, Fig. 5, till the mould is quite full, the flat piece of tin is then to be well greased, and thrust in at one end of the mould, and the back of the muffle is then formed by spreading the composition, and firmly pressing it against the part already formed. The next thing to be done is to cut the holes in the sides of the muffle, which is done by pressing the semicircular cutter, Fig. 3. into the sides thereof, while it is yet wet, and bringing the piece out entire: the tin mould must now have the frame, Fig. 4. put in. to keep the sides of the muffle from contracting, and being set up end-ways, and a little inclined, it must be dried in the sun, until it has shrunk sufficiently to leave the mould, after which it must be completely dried and burned in the usual manner.

The composition of the smaller implements, or muffle bottoms for dial plates, for the mould Figs. 9 and 10, is made of the finer part of the Stourbridge clay, with a small proportion of pipe clay.

The rings are made from two parts of Dutch black lead pots, powdered, and one part of pipe clay. I have made repeated trials of English black lead, in various states, as a sub-

a substitute for the Dutch black lead pots, but without finding it to answer properly.

Should any difficulty appear in any part of my process, I shall be happy in attending the Committees, and performing the whole operation before them, whenever they shall be pleased to appoint, when the great simplicity and advantage will appear evident.

I am,

My Lords and Gentlemen,

Your most obedient and respectful Servant,

EDMUND TURRELL.

No. 40, *Westmoreland Street, Goswell Road,*
April 10, 1806.

To the Members of the Society of
Arts, &c.

Certificates from Messrs. J. HAYNES and SON, Westmoreland Buildings; JOHN KELLY, Hooper-Street, Clerkenwell; JOHN FOSTER, Author-Street, St. Luke's, and WILLIAM FOSTER, Author-Street, St. Luke's, state, that they have been in the habit of using for upwards of twelve months, Mr. Turrell's muffles, and that they are greatly superior to any they have hitherto been able to procure, and that it is their opinion their durability may be completely attributed to his improved method of moulding them.

PAPER

Mr. E. Turrell's Construction of Chemical Muffles.

Fig: 12.

Fig: 7.

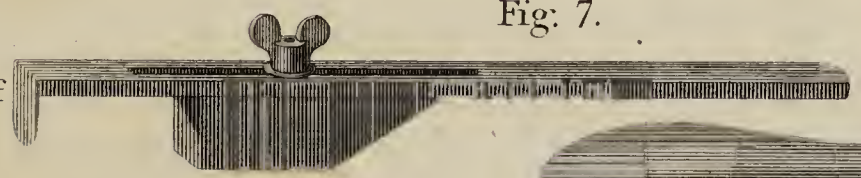


Fig: 5.

Fig: 6.

Fig: 9.

Fig: 10.

Fig: 2.

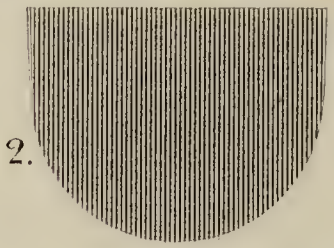


Fig: 13.

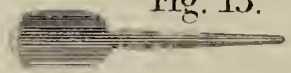


Fig: 8.

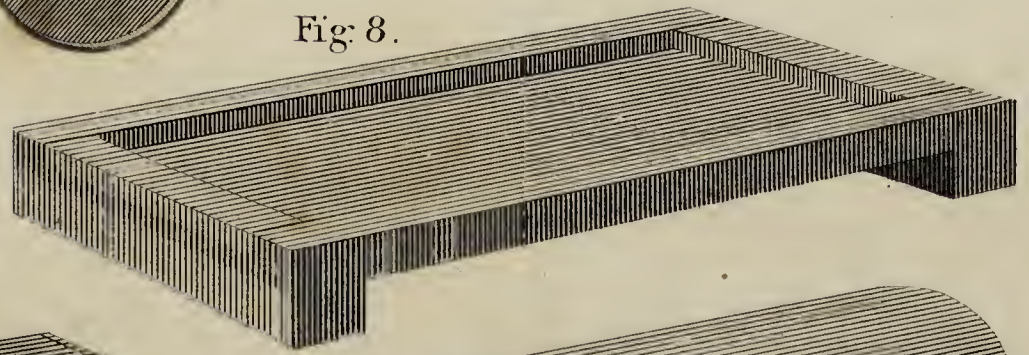


Fig: 4.

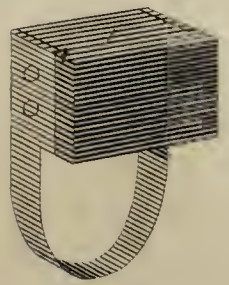


Fig: 3.

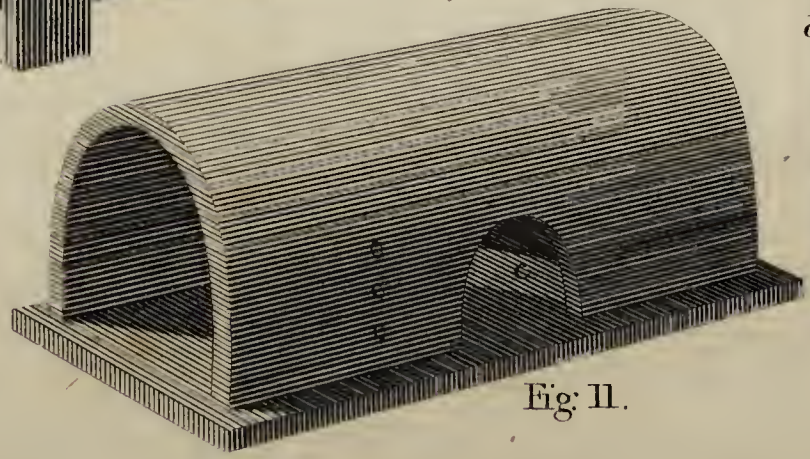


Fig: 11.

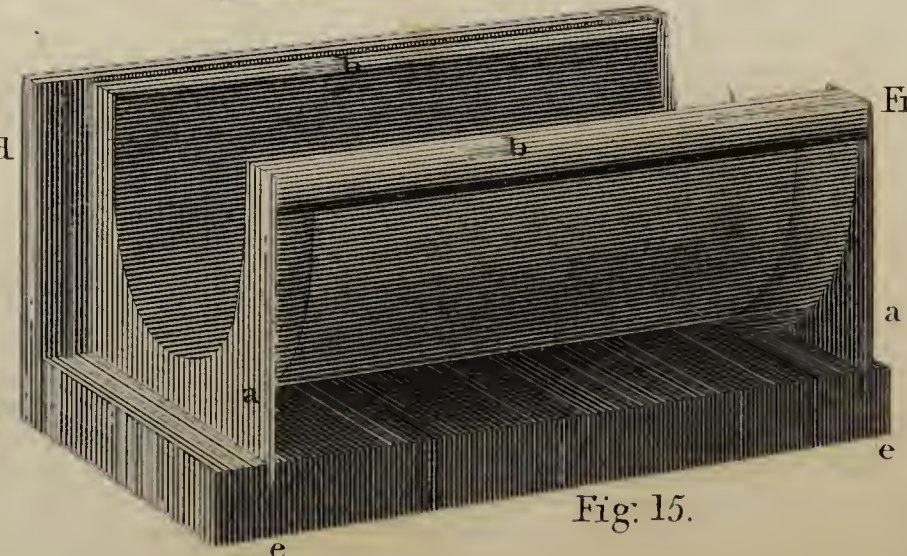


Fig: 1.

Fig: 15.

PAPER

IN

POLITE ARTS.

The THANKS *of the Society were this Session voted to Mrs.* HOOKER, *of Rottingdean, near Brighton, formerly Miss* EMMA JANE GREENLAND; *for Additional Remarks to her Method of making a Composition for Painting in Imitation of the Ancient Grecian Manner, as published in the 10th Volume of the Society's Transactions, for the Year 1792.*

A Specimen of this Mode of Painting is preserved in the Society's House.

SIR,

I HAD the pleasure to communicate to the Society for the Encouragement of Arts, Manufactures, and Commerce, in 1786, when Miss E. J. Greenland, my method of painting in imitation of the ancient Grecian manner or incaustic painting, and in consequence, they did me the honour to adjudge to me the Gold Pallet, and also afterwards to approve my account of the result of above fifty experiments per day, which

which I made during more than four months in 1792, in the hope of discovering some means of making wax, gum-mastich and water unite like a cream, in order to expedite the formation of the composition for imitating the incaustic painting, which was published the same year by the Society of Arts. I now take the liberty of sending them another copy, but with some alterations and many additions, which I trust will be found calculated to facilitate and improve that method of painting, as they have arisen from much observation and reflection on several pictures I have painted since I had last the honour of addressing the Society. In consequence of the application of several gentlemen of the profession, I have drawn up this paper, which considering the former attentions of the Society, I thought it would be proper for me to offer first to them for their acceptance, but if they should not think it worthy of communication, I hope they will pardon the intrusion, and attribute it only to the sense of gratitude I feel for the honour already conferred on,

Sir,

Your most obedient Servant,

EMMA JANE HOOKER.

Rottingdean, Brighton, March 16, 1807.

To Charles Taylor, M. D. Sec.

Method of preparing and applying a Composition for painting in Imitation of the Ancient Grecian Manner.

Put into a glazed earthern vessel, four ounces and a half of gum arabic, and eight ounces, or half a pint (wine measure) of cold spring water; when the gum is dissolved,

dissolved, stir in seven ounces of gum-mastich, which has been washed, dried, picked, and beaten fine. Set the earthern vessel containing the gum-water, and gum-mastich, over a slow fire, continually stirring and beating them hard with a spoon, in order to dissolve the gum-mastich: when sufficiently boiled, it will no longer appear transparent, but will become opaque, and stiff, like a paste. As soon as this is the case, and that the gum water and mastich are quite boiling, without taking them off the fire, add five ounces of white wax, broken into small pieces, stirring and beating the different ingredients together, till the wax is perfectly melted and has boiled. Then take the composition off the fire, as boiling it longer than necessary would only harden the wax, and prevent its mixing so well afterwards with water. When the composition is taken off the fire, and in the glazed earthern vessel, it should be beaten hard, and whilst hot (but not boiling) mix with it by degrees a pint (wine measure) or sixteen ounces more of cold spring water, then strain the composition, as some dirt will boil out of the gum-mastich, and put it into bottles: the composition if properly made, should be like a cream, and the colours when mixed with it, as smooth as with oil. The method of using it, is to mix with the composition upon an earthern pallet, such colours in powder as are used in painting with oil, and such a quantity of the composition to be mixed with the colours as to render them of the usual consistency of oil colours; then paint with fair water. The colours when mixed with the composition may be laid on either thick or thin, as may best suit your subject, on which account, this composition is very advantageous, where any particular transparency of colouring is required; but in most cases it answers best, if the colours be laid on thick, and they require the same use of the brush, as if

painting

painting with body colours, and the same brushes as used in oil painting. The colours if grown dry, when mixed with the composition, may be used by putting a little fair water over them; but it is less trouble to put some water when the colours are observed to be growing dry. In painting with this composition the colours blend without difficulty when wet, and even when dry the tints may easily be united by means of a brush and a very small quantity of fair water. When the painting is finished, put some white wax into a glazed earthern vessel over a slow fire, and when melted, but not boiling, with a hard brush cover the painting with the wax, and when cold take a moderately hot iron, such as is used for ironing linen, and so cold as not to hiss, if touched with any thing wet, and draw it lightly over the wax. The painting will appear as if under a cloud till the wax is perfectly cold, as also, whatever the picture is painted upon is quite cold; but if, when so, the painting should not appear sufficiently clear, it may be held before the fire, so far from it as to melt the wax but slowly; or the wax may be melted by holding a hot poker at such a distance as to melt it gently, especially such parts of the picture as should not appear sufficiently transparent or brilliant; for the oftener heat is applied to the picture, the greater will be the transparency and brilliancy of colouring; but the contrary effect would be produced if too sudden or too great a degree of heat was applied, or for too long a time, as it would draw the wax too much to the surface, and might likewise crack the paint. Should the coat of wax put over the painting when finished, appear in any part uneven; it may be remedied by drawing a moderately hot iron over it again as before-mentioned, or even by scraping the wax with a knife: and should the wax by too great or too long an application of heat form into bubbles at particular places, by

applying

applying a poker heated, or even a tobacco-pipe made hot, the bubbles would subside; or such defects may be removed by drawing any thing hard over the wax, which would close any small cavities.

When the picture is cold, rub it with a fine linen cloth. Paintings may be executed in this manner upon wood (having first pieces of wood let in behind, across the grain of the wood to prevent its warping,) canvass, card, or plaster of Paris. The plaster of Paris would require no other preparation than mixing some fine plaster of Paris in powder with cold water the thickness of a cream; then put it on a looking-glass, having first made a frame of bees-wax on the looking-glass the form and thickness you would wish the plaster of Paris to be of, and when dry take it off, and there will be a very smooth surface to paint upon. Wood and canvass are best covered with some grey tint mixed with the same composition of gum-arabic, gum-mastich, and wax, and of the same sort of colours as before-mentioned, before the design is begun in order to cover the grain of the wood or the threads of the canvass. Paintings may also be done in the same manner with only gum-water and gum-mastich, prepared the same way as the mastich and wax; but instead of putting seven ounces of mastich, and when boiling, adding five ounces of wax, mix twelve ounces of gum-mastich with the gum-water, prepared as mentioned in the first part of this receipt: before it is put on the fire, and when sufficiently boiled and beaten, and is a little cold, stir in by degrees twelve ounces, or three quarters of a pint, (wine measure) of cold spring water, and afterwards strain it. It would be equally practicable painting with wax alone, dissolved in gum-water in the following manner. Take twelve ounces or three quarters of a pint wine measure of cold spring water, and four ounces and a half of gum-arabic, put them into

a glazed earthern vessel, and when the gum is dissolved, add eight ounces of white wax. Put the earthern vessel with the gum-water and wax upon a slow fire, and stir them till the wax is dissolved and has boiled a few minutes: then take them off the fire and throw them into a bason, as by remaining in the hot earthern vessel the wax would become rather hard; beat the gum-water and wax till quite cold. As there is but a small proportion of water in comparison to the quantity of gum and wax, it would be necessary in mixing this composition with the colours, to put also some fair water. Should the composition be so made as to occasion the ingredients to separate in the bottle, it will become equally serviceable if shaken before used to mix with the colours.

I had lately an opportunity of discovering that the composition which had remained in a bottle since the year 1792, in which time it had grown dry and become as solid a substance as wax, returned to a cream-like consistence, and became again in as proper a state to mix with colours, as when it was first made, by putting a little cold water upon it, and suffering it to remain on a short time. I also lately found some of the mixture composed of only gum-arabic water and gum-mastich, of which I sent a specimen to the Society of Arts in 1792; it was become dry, and had much the appearance and consistency of horn. I found, on letting some cold water remain over it, that it became as fit for painting with, as when the composition was first prepared.

EMMA JANE HOOKER.

PAPER

IN

MANUFACTURES.

FIFTEEN GUINEAS *were this Session voted to Mr.* ALEXANDER DUFF, *of Church-Street, Bethnal Green, for an improved Machine for weaving Figured Work.*

The following Communication was received from him, and a working Model may be seen in the Society's Repository, with Patterns of the Figured Silk Goods woven by the Machine.

GENTLEMEN,

I HAVE sent a model of a machine for your inspection, of which I am the inventor, it is for the purpose of making figure-work in silk goods, or any branch of the weaving business; and though it is not altogether new, I flatter myself that it will be found to be very far superior to any heretofore made use of, as the others have been, generally speaking, not only extremely difficult to be understood, but liable to be very soon put out of order, the constant pressure of the

stomach, together with the depth of the tread in the old machines have also rendered the working of them very injurious to the health of the weaver. Now, Gentlemen, my machine is so contrived, that the most common capacity need not ever be at a loss to comprehend it. It is not so liable to go wrong as the old machines; it always keeps the figure in its form, which the others did not, and the weaver can do more work with it in ten hours, than he could with others in twelve, besides the advantage of working with less labour; the back weight of six or seven pounds not being here wanted, the weaver has no occasion to press against his stomach, as one foot balances against the other. It regularly keeps its course without any attention from the workman, and as soon as one figure is finished, it begins of itself the next, whereas the old machines can only work one course, and must then be pulled back. In case the shoot breaks, or the quill runs out, the workman pulls a small cord, and treads back as many shoots as he thinks he is gone wrong; and on pulling another small cord, he goes on with his course as before; but in the old machines it must be set by the workman, and with considerable loss of time. It is not so injurious to the silk or to any other article of manufacture, as it does not break so much, one foot balancing against the other in treading, but the machines before in use, are trod with one foot at a time and have no guard. It is, besides, so constructed that it stands in less room, and is free from all noise in the working, and, moreover, it is less expensive than any yet contrived, the price of those in use being from three to five pounds, whereas mine can be made for two.

I have only, Gentlemen, further to add, that I and my wife are, at this time making figured-work with the machine in question, for Messrs. Douglas, Heron, and Co. No. 46, Bow-Lane, Cheapside; and Messrs. Doxey and Gibson, No.

No. 19, Friday-Street. My machine may be seen by any person the Society may appoint to examine its merits, and I have the satisfaction of saying, that my employers approve my work.

I beg leave to subjoin a list of those persons who have testified their approbation of my machine, and who will, if requisite, come forward in its support.

I have the honour to be,

Gentlemen,

Your obedient Servant,

ALEX. DUFF.

King's Head, Church-Street, Bethnall Green, Feb. 12, 1806.

To C. Taylor, M. D. Sec.

Persons who have testified their Approbation of Mr. Duff's Machine.

P. Obree, Jayson-Street, Bethnall Green.
W. Jones, Vispeney-Row, Bethnall Green.
John Fary, Thorold-Square, Bethnall Green.
John Fary, Jun. ditto.
John Gale, ditto.
Robert Vickers, Church-Street, Mile End.
William Barnett, Broker and Weaver, Club-Row, Bethnall Green.

PAPERS

IN

MECHANICS.

The GOLD MEDAL *of the Society was this Session voted to Mr.* CHRISTOPHER WILSON, *Richard-Street, Commercial Road, London, for a secure Sailing Boat, or Life Boat.*

The following Communications were received from him, and explanatory Engravings are annexed.

A Model and Drawings are preserved in the Society's Repository.

SIR,

HEREWITH you will receive Drawings of a neutral-built self-balanced Boat, with an explanation, which I request you will have the goodness to lay before the Society for the Encouragement of Arts, &c. for their inspection and approbation. I have made the explanation as clear as I can. Its construction will obviate the danger of its being overset by persons crowding on one side, in getting in or out

of the boat; it will facilitate the landing of men on shore or in boarding ships, and will carry a much greater press of sail without danger.

As to the building part, I think that may be easily understood. My boat was made by men that had never before seen a boat built, and I flatter myself the Society will approve of it.

I am, Sir,

Your most obedent humble Servant,

CHRISTOPHER WILSON.

March 10, 1806.

To C. TAYLOR, M. D. SEC.

An Explanation of the Engravings of a neutral-built self-balanced Boat.

By the term neutral is meant, what is neither of the two present modes now in use, i. e. clincher and carver, but both united, viz. clincher in the inside and carver on the outside, which neutralizes both the two into a third; and as every thing has a distinguishing name, I have taken the liberty to present it to the public, under the name of a Neutral Boat.

The two modes of clincher and carver-built have each their separate advantages and disadvantages in regard to each other.

I shall begin with the clincher first. As the sides of the planks are firmly fastened to each other, by lapping over and rivetting, they are much stronger than if the edges only butted, and they have the property of being made tight without caulking, only in the huddings and keel seams,

seams, and are much lighter than carver-built boats, and more adapted for many uses; beside saving the difference between thick and thin plank. But they have their disadvantages also; in the first place, both unfair sides and unfair water lines, which makes them liable to be injured by other bodies they come in contact with, and have the edges of the planks broke so as to make a leak, which would not happen to a smooth-sided boat, neither can the uneven side move so well through the water, on account of its various resistances. They have also this disadvantage, that if damaged, they require the skill of a professional workman to repair them.

The carver built boats have the advantage of having smooth sides and fair water lines, together with having the planks of an equal thickness all over the boat, which makes them less liable to receive injuries when meeting with other bodies, and more adapted to move in the water, by their fair sides and fair water lines. They are also more readily repaired: if a professional boat-builder is not at hand, it can be done by a common shipwright, or any workman that is used to wood work.

But they have also their disadvantages; in the first instance they are under the necessity of being built of plank of a great thickness to stand caulking; at the same time they require larger timbers, which makes them heavy and unfit for many uses, and also a great consumption of timber on account of the thickness of the plank necessary. They are also more subject to leaks from various causes than clincher-built boats.

We will now look to the neutral system, and see if both their advantages are not united, and both the disadvantages got clear of.

Plate 4, Fig. 2, shows the section of the fore part of a boat.

boat. The longitudinal slips are represented lighter-coloured, and placed over the joints where the edges of the planks meet; they must be rivetted on to each adjoining plank, near the edge, in the same manner as clincher-built vessels, with a sufficient quantity of blair, made of tar and flocks, such as is in common use in the North of England, (or any other caulking), between the slips and planks, which will always keep them tight, as long as the boat remains unstaved, or the planks worn through. These slips, each being rivetted to the two adjoining edges of the planks, as shown in Fig. 4, will make the joint as strong as the joint of a common clincher-built boat, and as tight, without the risk of any external damage. Those joints have also this advantage, that the planks will not have their sides bevelled off, but be of an equal thickness from edge to edge, which is not the case in clincher-built vessels, for at the ends they are half bevelled away, so as not to bear clinching. By the neutral system two inches in the breadth of each plank will be saved in the laps, which may be considerable in the conversion of plank. I set little value on the slips, as there is always a sufficiency of waste in cutting the planks to a proper form.

A boat of this construction has all the strength of one clincher-built, and can be made as light or lighter. It is free from the disadvantages of irregular outsides, and from the difficulty of repairing, which in this can be performed by any common workman in wood, as I have found by experience. A boat built this way has a fair and smooth outside, it has all the advantages of a carver-built one, at the same time it is clear of the disadvantages of being loaded with unnecessary wood, which makes the carver-work very heavy, the liability of leaks, and frequent want of caulking. There is one evil which both carver and clincher-built boats have

Mr. C. Wilson's secure Sailing Boat or Life Boat.

Fig: 1.

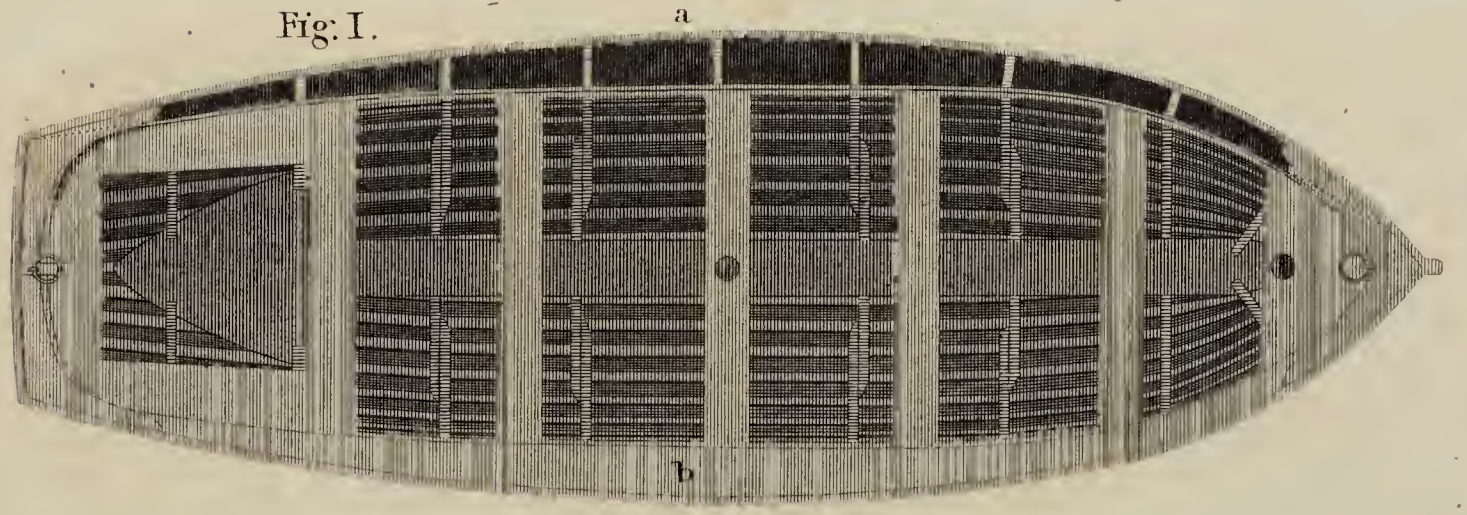


Fig: 2.

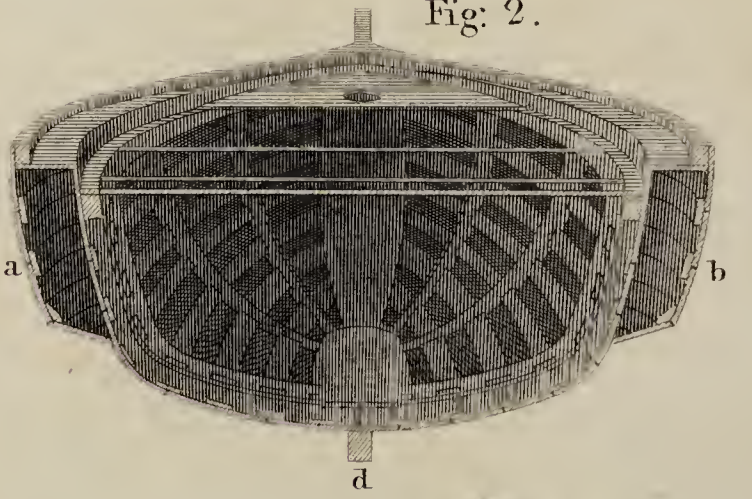
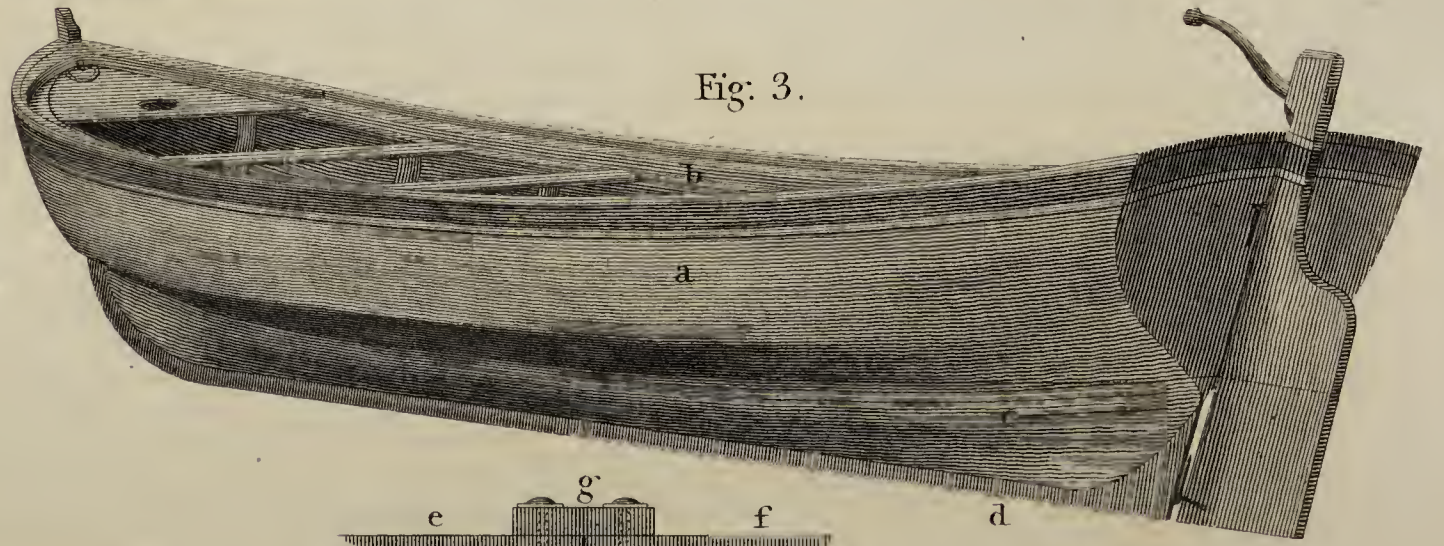


Fig: 3.



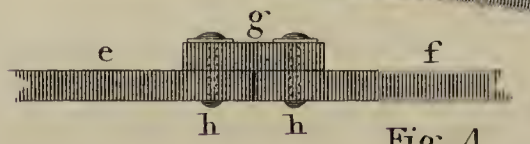
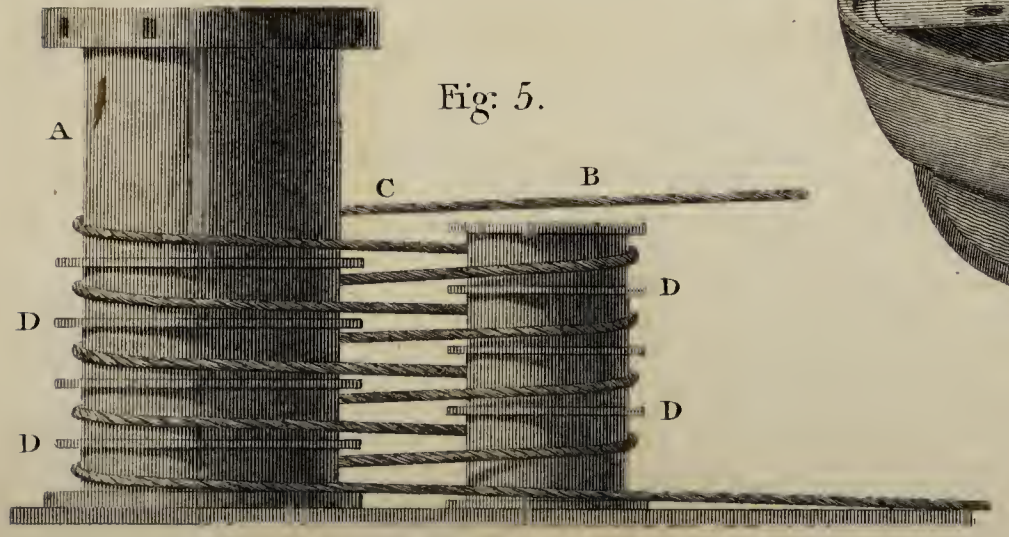


Fig: 4.

Fig: 5.



Mr. I. W. Boswell's improved Capstan.

have in common, that of having keel seams, and a vacancy between the sand or garboard streak, and the upper part of the keel, which soon gets filled with dirt, and remains so, which naturally retains moisture, and speedily rots the wood. In this mode that evil is removed, by having the midship plank bolted on to the keel, wide enough to come over each side of the keel to clinch the slips on, this not only removes the evil, but saves a great deal of trouble in making the rabbets in the keel, and various bevellings in the sand streaks, which must be done by a good workman.

These boats require no larger timbers than common clincher-built boats, as the timbers need no greater notches, but with this difference, that these timbers will catch the slips that are rivetted over the joints of the planks each way, and so the timbers and slips will brace one another, and add an additional strength; but in the clincher-built boats, the timbers catch the laps of the seams only one way, and consequently form no brace whatever.

All I need to explain further on the neutral system is its application. It can be applied to all open boats, of whatever form or use, to all coal and other barges, lighters, or any vessels used in rivers or canals, and also to all large cutters and luggers, which are now clincher-built.

Explanation of Plate 4, *Fig.* 1, 2, 3, 4.

Fig. 1, is a bird's-eye view of the boat, shewing the projecting balance bodies, or hollow sides *a b*, one of which *a*, is left open to show the partitions which are placed opposite to each timber, and are water-tight; by this means if one or more should be broken, the rest would keep the vessel buoyant. These partitions gradually lessen towards each

each end, where the planks unite, so as to make a similar appearance to any other boat when in the water.

Fig. 2, shews the depth and form of the cells or hollows, as they appear in a section of the boat; also the manner in which the slips are placed over the joinings, or seams of the planks.

Fig. 3, is a perspective view of the boat, in which *a b* show the projecting balance bodies, or hollow sides, which would render the boat buoyant if her bottom was staved in. *c*, the lower part or body of the boat, from which the projections commence; *d*, the keel.

Fig. 4, shows the manner in which the planks or timbers of the boat are united; *e f*, are two planks of the boat; *g*, the slip of wood placed over them, and secured to them by the rivets *h h*.

The section (Fig. 2), will best explain the nature and utility of the self-balanced boat. The balance bodies form two separate holds, to put any thing in, such as provision, arms, &c. which are wanted to be kept dry, having locker lids, to open at the top of the different partitions in the holds, as fancy or utility may require; or part of them may be filled with cork shavings, and by that means, if the boat should happen to fill by any accident, she cannot sink.

In the boat I have altered for Government, the balance bodies, (if the interior of the boat was filled with water), would exclude as much water, between the inside of the boat and the outside, as is equal to a body of water of 1ton. 17cwt. 2qrs. which is a great deal more than the weight of men that will go in her, consequently they can run no risk whatever of being drowned, and even if she had a hole through her bottom, she would always keep a sufficient height out of the water either for rowing or sailing.

But the main object is to make her sail and row much faster

faster than other boats, and both on calculation and trial my boat will be found to sail much faster, and with much less danger than other boats.

I now come to the advantage of rowing.—As the balance sides project a foot beyond the resisting part in the water, there is that leverage on the boat (over a common one), and also the same in the length of the loom of the oar, that is in the inside from the gunwale of the boat, which allows the whole of the oar to be lengthened, and by that means it describes a larger circle in the water, and makes a longer pull: the oars for the Government boat I have made, are lengthened from 14 to 18 feet.

The experiment of having two spars fixed at a distance from a boat's gunwale, and the oars to work from them, has often been tried and found to answer, but this has a great advantage over that method.

There is another advantage or property which this boat has, she cannot roll at sea, but always keeps a level position as far as the surface of the sea will allow; she may heel but not roll, as the balances are always ready to catch either way, and the opposite one assists the other by its weight out of water and gravitation; neither can this boat pitch like another, for the balance bodies being out of the water, and the breadth of six feet only in the water, it can only act with a gravity on the water, equal to a boat of the weight of six feet, but as the resistance of the water upwards equal to a boat of eight feet wide.

Or I may make this mechanical simile: Suppose a workman uses a chissel to smooth a surface of wood, by laying too great a stress on the tool it will go too far into the wood for him to force it along in the direction wanted, but put that chissel into a stock like a plane-stock, and set it to the depth required, then the stock will prevent its going too

far

far in, and he can work easily though the plane be pressed on ever so hard. A view of the Engraving will elucidate that comparison, as the balance bodies lie parallel with the surface of the water lengthways. The national importance of such boats, I leave to the public to decide. I must here observe, that my plan contains two distinct and separate improvements, viz. my neutral mode of building, and the application of the balance bodies.

The first improvement relates to the *building* of boats, barges, &c. in general. The second is only partial, and applicable to boats of peculiar descriptions or uses; that is, all such as are wanted for dispatch, safety, or pleasure, or occasionally for life-boats: as there can be no question of the self-balanced boats built upon my plan, rowing and sailing faster than other boats, and they may be used to go to sea when others cannot; but the application of the balance bodies is not meant as a general one, as it is not fit for vessels of burthen that are sometimes light, and at others heavy laden, when the difference of the draught of water is considerable.

CHRISTOPHER WILSON.

CERTIFICATE.—We whose names are hereunto subscribed have examined the boat building on Mr. Wilson's plan, (which he calls the neutral plan) and are of opinion that it will be attended with many advantages.

The boats can be built as light as those that are clincher-built, preserving a smooth surface, and will not require caulking; and they can be easily repaired by any carpenter.

The advantage this boat possesses by having air gunwales are obvious, and from the partial trial we have had of

of the boat's sailing which he has altered, we are of opinion that his improvement in the keel and formation of the boat's bottom, will give her greater stability than other boats of the same dimensions, with the properties of sailing well and drawing very little water.

MALCOLM COWAN, R. N.
JAMES NICOLSON, R. N.

London, May 7, 1806.

GENTLEMEN,

PERMIT me to present my thanks and acknowledgments for the truly polite and distinguished manner in which (though a stranger,) you have permitted me to visit your Committee; the Society of which the same is formed I hold in the highest estimation, and have deeply to regret the distance that prevents my offering myself a candidate for a seat amongst you.

The last time I had the honour of attending your Committee, Mr. Wilson's new Life-Boat became the subject of discussion, the operation of which you did me the honour of requesting me to acquaint you of as soon as an opportunity presented itself for a fair trial of her at sea.

About three o'clock in the afternoon of Friday last, the tide being about quarter flood, and the wind at South-west, blowing excessively hard, an object was discovered in the Offing at about two leagues distance, bearing from the piers of Newhaven, W. S. W. which had the appearance of a vessel

vessel water-logged, and with only her foremast standing. This induced Mr. Thomas Tasker (the person whom I appointed master of the boat, and which I have named the *Adeline*,) with seven others, to put to sea, with a view of rendering assistance to the supposed distressed vessel, and although the breakers were tremendous, and the sea without them running very high, the boat under the management of the crew before-mentioned, ranged as coxswain, six setters, and a bowman, went out of the harbour in a very lively stile, and soon came up with the object in pursuit, which proved to be a beacon, or light-house, of a singular construction triangularly built, and clench-board covered in its floating case, with a mast rigged out in the centre of one of the sides, and supposed to have broken a drift from the enemy's coast by the boisterous weather: finding its magnitude too vast for their strength to tow, and the evening approaching, they returned. Numbers of persons were assembled on the piers to witness the action, power, and performance of the boat, who were highly pleased and gratified. I was not present myself, but the next morning one of the crew was sent to me from Newhaven to this place, who stated that the whole of them were so fully satisfied with the safety and superior powers of the boat, that they shall not be afraid to put to sea in any weather when the distresses of their fellow-creatures claim their exertions and assistance. They particularly observed, she, with the six oars manned, pulled extremely light and easy through the water, and that though the breakers they pulled through, and the heavy seas they rode over were awful, she did not ship ten gallons of water the whole trip, neither were the men wet on the seats. We have now at Newhaven one of Mr. Greathead's boats, provided by subscription, but from the difficulty of getting her to sea, and her weight and construction

rendering

rendering it almost impossible to pull her through the broken water, it is very improbable she will ever be used.

My opinion is, that Mr. Wilson's boat will answer. Its cost I conceive will exceed 150*l.* including the building and fitting her out.

I have the honour to subscribe myself with the greatest respect,

Gentlemen,

Your obliged and most

obedient humble Servant,

WILLIAM BALCOMBE LANGRIDGE.

P. S. I should have observed, that the crew pulled her *stern on* at every sea, and that such water as in general fills over the bow of ordinary boats, is received by the fore-part of her flammings, or floor of extended sides, and sent or dispersed side-ways.

Lewes, Sussex, Dec. 25, 1806.

To C. Taylor, M. D. Sec.

The Gold Medal *of the Society was this Session voted to* J. Whitley Boswell, *Esq. of No.* 13, *Clifford's Inn, for his Model of a Capstan, which works without requiring the Messenger or Cable coiled round it to be ever surged.*

The following Communications were received from him, and an explanatory Engraving is annexed

A Model of the Machine is placed in the Society's Repository.

SIR,

I request you will lay before the Society of Arts, &c. the model of a capstan contrived by me, which works without requiring the messenger or cable coiled round it to be

ever surged, an operation necessary with common capstans, which is always attended with delay, and frequently with danger. Capstans of this kind can be made by a common shipwright, and would not be liable to be put out of order. They also would not occasion any additional friction or wear to the messenger or cable, in which particulars they would be superior to the other contrivance hitherto brought forward for the same purpose; they also would much facilitate the holding on.

The great loss of time and great trouble which always attends applications to the Navy Board, prevent my attempting to bring the matter before the public through that channel, though I have had the most unequivocal approbation of the capstan from the two gentlemen of that board best qualified to judge of it. I mention this, least it might be thought that my not applying there first was from any doubt of the goodness of the invention. If the Society should approve of the capstan, I will draw up a more minute account of it for publication.

I am Sir,
Your very humble Servant,

Hatton Garden, Oct. 29, 1806.

To C. TAYLOR, M. D. SEC. J. W. BOSWELL.

SIR,

I HAVE examined your model of a Capstan, which is calculated to prevent the surging of the messenger when heaving in the cable, it certainly possesses great merit, and the idea to me is quite new.

I am, Sir,
Your humble Servant,
WILLIAM RULE.

Somerset-place, November 19, 1806.

To MR. BOSWELL.

SIR,

SIR,

ACCORDING to your desire, I transcribe the part of the letter from Mr. Peake (Surveyor of the Navy) to me, which relates to the capstan laid before the Society.

Extract of a Letter from Henry Peake, Esq.

"With regard to your ideas on the capstan; I have tried "all I can to find some objection to it, but confess I "hitherto have been foiled, and shall more readily forward "it, if it was only to supersede a plan now creeping into "the service, more expensive, and much worse than one "lately exploded."

As you and the members of the Committee have seen the letter, I imagine further attestation needless relative to it.

I request you will mention, that all friction of the revolutions of the cable (or messenger) in passing each other between the barrels of the capstan, must be effectually prevented by the whole thickness of one of the rings that passes betwixt each crossing. I add this because one of the gentlemen of the Committee wished to be informed on this point.

I am, Sir,
Your very respectful humble Servant,

J. W. BOSWELL.

Hatton Garden, November 26, 1806.

To C. TAYLOR, M.D. SEC.

SIR,

In obedience to your intimation, that a written explanation of the advantages to be obtained by the use of capstans made according to the model, which I laid before the Society for the Encouragement of Arts, &c. would be acceptable, I send the following, which I hope will make the subject sufficiently clear.

As few but mariners understand the manner in which cables are hawled aboard in large ships, it will probably render the object of my capstan more manifest, to give some account of this operation.—Cables above a certain diameter, are too inflexible to admit of being coiled round a capstan; in ships where cables of such large dimensions are necessary, a smaller cable is employed for this purpose, which is called the *messenger*, the two ends of which are made fast together so as to form an endless rope, which, as the capstan is turned about, revolves round it in unceasing succession, passing on its course to the head of the ship, and again returning to the capstan. To this returning part of the messenger, the great cable is made fast by a number of small ropes, called nippers, placed at regular intervals; these nippers are applied, as the cable enters the hawse hole, and are again removed as it approaches the capstan, after which it is lowered into the cable tier.

The messenger, or any other rope coiled round the capstan, must descend a space at every revolution, equal to the diameter of the rope or cable used; this circumstance brings the coils in a few turns to the bottom of the capstan, when it can no longer be turned round, till the coils are loosened and raised up to its other extremity, after which the motion proceeds as before. This operation of shifting the place of

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the coils of the messenger on the capstan, is called *surging the messenger:* It always causes considerable delay; and when the messenger chances to slip in changing its position, which sometimes happens, no small danger is incurred by those who are employed about the capstan.

The first method that I know of, used to prevent the necessity of surging, was by placing an horizontal roller beneath the messenger, where it first entered on the capstan so supported by a frame, in which it turned on gudgeons, that the messenger in passing over it was compelled to force upwards all the coils above the capstan, as it formed a new coil.

This violent forcing of the coils upwards along the barrel of the capstan, not only adds considerably to the labour in turning the capstan, but from the great friction which the messenger must suffer in the operation, while pressed so hard against the capstan, (as it must be by the weight of the anchor and strain of the men,) could not but cause a very great wear and injury to the messenger, or other cable wound round the capstan; and that this wear must occasion an expense of no small amount, must be manifest on considering the large sums which the smallest cables used for this purpose cost.

The next method applied to prevent surging, was that for which Mr. Plucknet obtained a patent, the specification of which may be seen in the Repertory of Arts, No. 46: In this way a number of upright puppets or lifters, placed round the capstan, were made to rise in succession, as the capstan turned round by a circular inclined plane placed beneath them, over which their lower extremities moved on friction wheels, and these puppets, as they rose, forced upwards the coils of the messenger on the barrel of the capstan. This was a superior method to the first, as the operation of

forcing upwards the coils, was performed more gradually by it; but still the wear of the messenger from the lateral friction in rising against the whelps of the capstan remain undiminished.

The third method used for the same purpose, was that proposed by captain Hamilton. It consisted in giving the capstan a conical shape, with an angle so obtuse, that the strain of the messenger forced the coils to ascend along the sloped sides of the barrel. The roller first mentioned was sometimes used with this capstan, of which a full account is inserted in the Repertory of Arts, vol. 2. The lateral friction, and wear of the messenger against the whelps of the capstan, is equally great in this method as in the others; and it, besides, has the inconvenience of causing the coils to become loose as they ascend; for as the upper part of the barrel is near a third less in diameter than the lower part, the round of the messenger that tightly embraced the lower part, must exceed the circumference of the upper extremity in the same proportion.

In the method of preventing the necessity of surging, which the model I have had the honour of laying before the Society represents, none of the lateral friction of the messenger or cable against the whelps of the capstan, (which all the other methods of effecting the same purpose before-mentioned labour under,) can possibly take place, and of course the wear of the messenger occasioned thereby will be entirely avoided in it, while it performs its purpose more smoothly, equally, and with a less moving power than any of them.

My method of preventing the necessity of surging, consists in the simple addition of a second smaller barrel or capstan of less dimensions to the large one; beside which it is to be placed in a similar manner, and which need not

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in general exceed the size of an half-barrel cask: The coils of the messenger are to be passed alternately round the large capstan and this small barrel, but with their direction reversed on the different barrels, so that they may cross each other in the interval between the barrels, in order that they may have the more extensive contact with, and better gripe on each barrel. To keep the coils distinct, and prevent their touching each other in passing from one barrel to the other, projecting rings are fastened round each barrel, at a distance from each other equal to about two diameters of the messenger and the thickness of the ring. Those rings should be so fixed on the two barrels, that those on one barrel should be exactly opposite the middle of the intervals between those on the other barrel: and this is the only circumstance which requires any particular attention in the construction of this capstan. The rings should project about as much as the cable or messenger from the barrels, which may be formed with whelps, and in every other respect, not before-mentioned, in the usual manner for capstan barrels, only that I would recommend the whelps to be formed without any inclination inwards at the top, but to stand upright all round, so as to form the body of the capstan in the shape of a polygonal prism, if the intervals between the whelps are filled up, in order that the coils may have equal tension at the top, and at the bottom of the barrels, and that the defect which conical barrels cause in this respect may be avoided.

The small barrel should be furnished with falling palls as well as the large ones; a fixed iron spindle ascending from the deck will be the best for it, as it will take up less room. This spindle may be secured below the deck, so as to bear any strain, as the small barrel need not be much above half the height of the large barrel; the capstan bars can

easily pass over it in heaving round, when it is thought fit to use capstan bars on the same deck with the small barrel. As two turns of the messenger round both barrels will be at least equivalent to three turns round the common capstan, it will hardly ever be necessary to use more than four turns round the two barrels.

The circumstance which prevents the lateral friction of the messenger in my double capstan, is, that in it each coil is kept distinct from the rest, and must pass on to the second barrel, before it can gain the next elevation on the first, by which no one coil can have any influence in raising or depressing another; and what each separate coil descends in a single revolution, it regains as much as is necessary in its passage between the barrels, where in the air, and free from all contact with any part of the apparatus, it attains an higher elevation without a possibility of friction or wear.

I have described my double capstan, as it is to be used in large vessels, where messengers are necessary, from the great size of the cables; but it is obvious that it is equally applicable in smaller vessels, as their cables can be managed with it in the same manner as is directed for the messenger. The same principle may also be easily applied to windlasses, by having a small horizontal barrel placed parallel to the body of the windlass, and having both fitted with rings, in the same way as the capstan already described. The proper place for the small horizontal barrel is forward, just before the windlass, and as much below its level as circumstances will admit; it should be furnished with catch-palls as well as the windlass.

Besides the advantages already stated, my proposed improvement to the capstan has others of considerable utility. Its construction is so very simple, that it is no more liable to derangement or injury than the capstan itself. Its cost can

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be but small, and every part of it can be made by a common ship carpenter, and be repaired by him at sea if damaged by shot. It will take up but little room, only that of an half-barrel cask; and it is of a nature so analogous to that kind of machinery to which sailors are accustomed, that it can be readily understood and managed by them.

In order to render the description of my double capstan more clear, I annex a sketch of it, as fitted up in the manner proposed.

I am, Sir,

Your very respectful humble Servant,

J. WITLEY BOSWELL.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. Boswell's improved Capstan, to prevent the necessity of surging. Plate 4, *Fig.* 5.

A Represents the larger or common capstan used on board ships.

B Another capstan of less dimensions, placed in a similar manner.

C The coils of the messenger passing alternately round the large and small capstans, but with their direction reversed on the different barrels, so that they may cross each other in the interval between them.

D D D D Projecting rings round each capstan or barrel, so fixed on the two barrels, that those on one barrel should be exactly opposite the middle of the intervals between those on the other barrel.

TWENTY GUINEAS *were this Session voted to Mr.* GILBERT GILPIN, *of Old Park Iron Works, near Shifnal, for his Machine for raising Coals, or other Articles, from Mines.*

The following Communications were received from him, and an explanatory Engraving is annexed.

A complete Working Model and Drawings are placed in the Society's Repository.

SIR,

THE improvement of the machines in use for raising coal and ore from the mines, has long been a desideratum of the Society for the Encouragement of Arts, Manufactures, and Commerce, and they have repeatedly offered a premium for that purpose.

Those in general use (from the encreased expense of horse labour), are worked by a steam engine, attached to a crank of twenty-one inches radius, wedged on a shaft along with a fly wheel, eleven or twelve feet in diameter, and pinion wheel, of eleven teeth, which latter works in another of sixty-four teeth, on the shaft of which is a plain cylindrical barrel, from four to six feet diameter, and nine or ten feet long; some have barrels formed of frustums of cones, (whose perimeters are in the proportion of about five to four), united at their bases, and of various diameters; the axes of both kinds are placed at right angles with the centre line of the pit, and at each end a rope of six inches in circumference is made fast by a staple, which ropes work (in contrary directions at the same time) over two pulleys, placed in a frame parallel to each other, and at an equal distance from the centre of the pit; to the ends of these ropes the baskets of coal and ore to be raised are hooked.

The simplicity of their general structure is such as, perhaps,

haps, not to admit of any considerable improvement; but the forms of the barrels are very defective.

On putting one of these machines in motion each rope forms a triangle, the lines thereof from the pulley to the first and last coil, and the surface of the barrel, forming its three sides. Upon the cylindrical barrel the load always tends, from gravitation, towards the nearest point of contact with the centre of motion of the barrel, and, in consequence, the ascending rope at first bends around it in receding coils from the subtending side of the angle, diminishing their distances as they approach the nearest point of contact, (where the rope crosses the centres of the pulley and barrel at right angles), thereby leaving a great part of the latter uncovered by the rope, and hence the necessity of such long ones; afterwards coiling hard against itself as it approaches the other side of the triangle, to its great injury in wear.

The barrels formed of frustums of cones, united at their bases, whose perimeters are in the proportion of about five to four, are equally defective, on account of the rope, for the reason before mentioned, binding hard against itself, and even sometimes, (in wet weather, when its rigidity is encreased by absorption of water,) folding at first in receding coils, and afterwards so hard against itself as to force those receding coils to slip suddenly towards the small perimeter of the cone, thereby making a large portion of the rope to descend the pit in an instant, breaking the rope by the sudden jerk, and frequently causing the immediate destruction of the men who may be ascending the pit at the time, or dashing to pieces the basket and its contents.

Besides the unnecessary expence arising from the use of hempen ropes, and the breakage of chains when applied in the common way, the forms of the barrels are quite erroneous

neous in principle. Some are cylindrical; others formed of frustums of cones united at their bases, without any determinate proportion in their perimeters, or regard to the weight of the rope or chain working thereon, both of which are absolutely necessary to acquire a maximum effect.

The convex surface of a frustum of a cone, is = to the convex surface of a cylinder of the same altitude, having its circumference = to half the sum of the perimeters of the frustum: and circumferences of circles being to one another as their diameters, the surface of a barrel formed of two frustums of right cones (united at their bases), each 64 inches diameter at one end, 32 at the other, and 54 long, which is the size we have adopted here, is = to the surface of a plain cylindrical one, 48 inches diameter, and 108 long. Each will therefore bend the same length of cordage in an equal number of revolutions, and so far they are equal to each other; but they vary very considerably in the momenta required to work them.

Let a = the weight of the basket of coal, and b = that of the descending part of the chain; then, on the cylindrical barrel, when the former is hooked to the end of the latter, and eased from the bottom of the pit (the opposite chain being bent on the barrel), $a + b$ = the counterpoise required at 24 inches radius; and when it is wound up to the top (the descending part of the opposite chain hanging down the pit), $a - b$ = the counterpoise required at the same radius.

On the barrel formed of frustums of right cones, when the load is eased from the bottom of the pit, it and the chain are suspended from one of the smaller perimeters (the opposite chain being bent on the barrel), $\frac{a}{2} + \frac{b}{2}$ = the counterpoise required at 32 inches radius; and when it is wound

Mr. Gilpin's Machine for raising Coals, Ore &c.

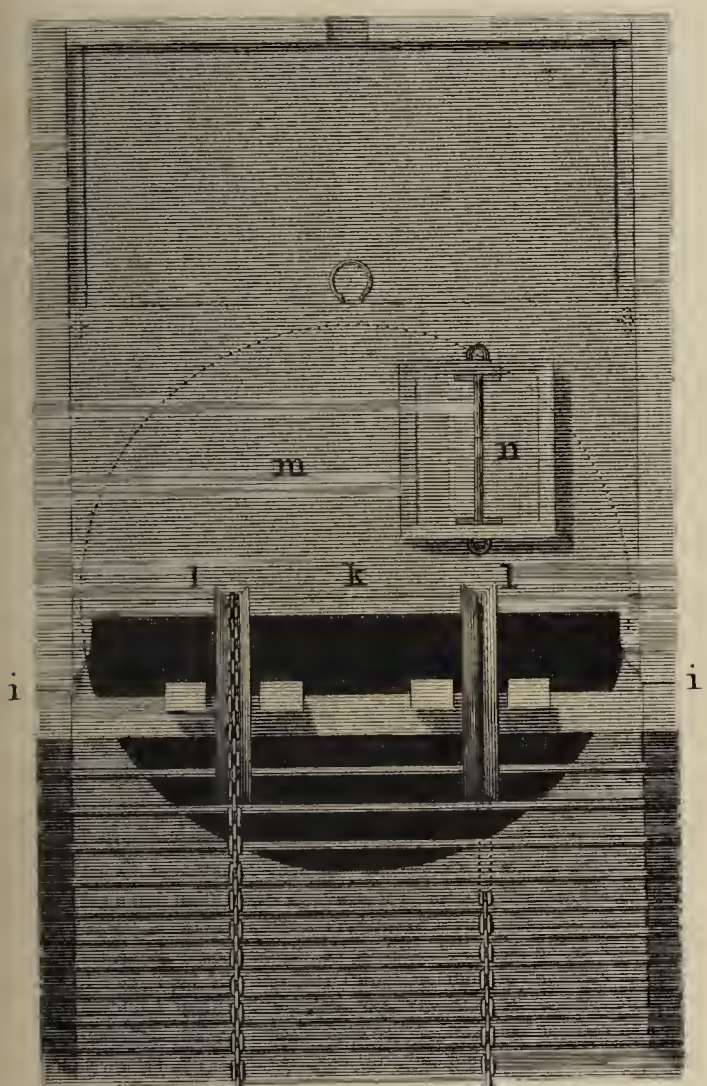


Fig: 4.

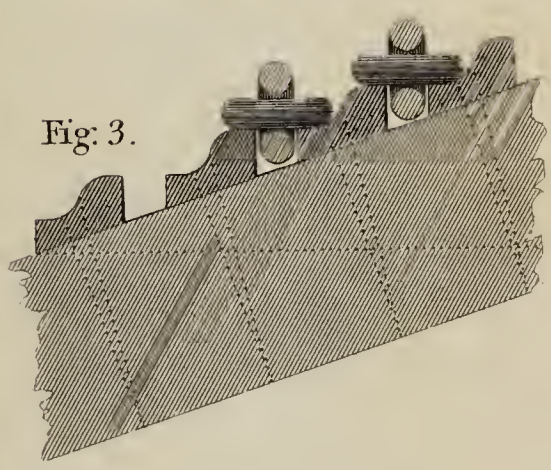


Fig: 3.

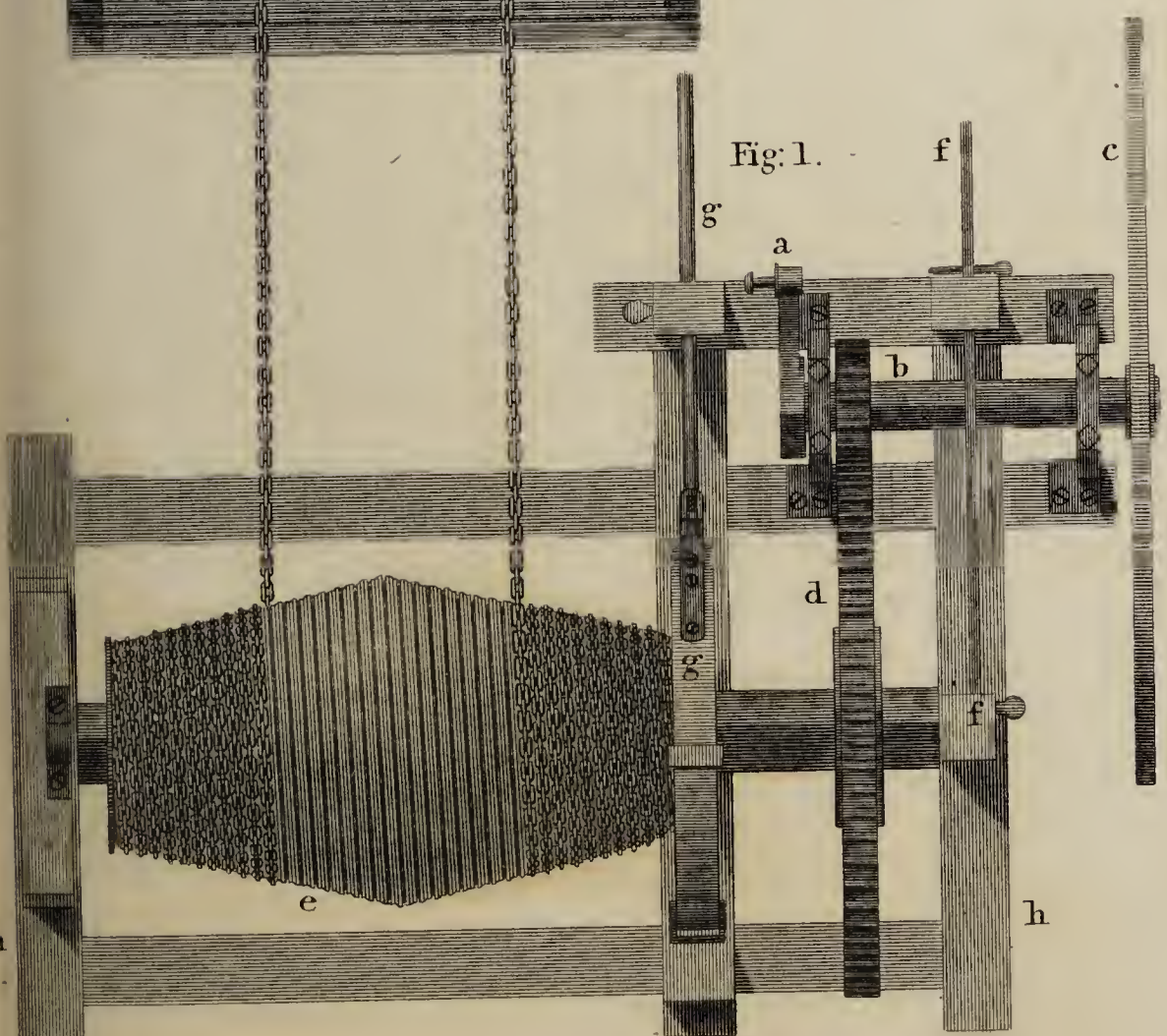


Fig: 1.

wound to the top of the pit, it is suspended from the larger perimeter of one frustum, whilst the descending part of the opposite chain is hanging down the pit from the smaller perimeter of the other, and in that position $a - \frac{b}{2}$ = the counterpoise required at the same radius.

Consequently, by supposing a, the weight of the basket of coal, to be 800lbs. and b, the weight of the descending part of the chain, 400lbs. (these are the weights which we have adopted here), we have the counterpoise required upon the cylindrical barrel, at 24 inches radius, 1200 lbs. when the basket of coals is at the bottom of the pit, and 400 lbs. when it is at the top; but upon the barrel formed of frustums of right cones, the counterpoise required at 32 inches radius is 600lbs. in each position. And as the counterpoise required is in inverse proportion to the length of the radius at which it is applied, we have 24 : 32 :: 600 : 800 lbs. the counterpoise required upon the barrel formed of frustums of right cones, at 24 inches radius. Again, as the descending part of a chain + a basket of coal of double its weight, unbending out of equi-distant grooves from the base of a frustum of a right cone, towards its smaller perimeter, balances in every revolution of the barrel, a chain of equal weight + a basket of coal, of double its weight, bending into equi-distant grooves from the smaller perimeter of a similar frustum towards its base, the counterpoise required must be equal in all parts of the descent.

So that by making the weight of the basket of coal to that of the chain, and the perimeters of the frustums of cones, which form the barrel, to each other, in the proportion of two to one, *a maximum is obtained, by which a barrel of this description requires one-third less momentum, (and consequently one third less expence), to work it than a cylindrical one.*

The

The barrels are made by nailing two to three inch planks upon wooden or iron curves, as in the common way, and afterwards folded, spirally, with wrought iron tire, so as to leave a vacancy of about half an inch between each fold, for the lower part of the ellipses of those links of the chain which work vertically to move in, and keep the coils at an equal distance from each other.

The wrought-iron tire is of two kinds, the one for conical, and the other for cylindrical barrels; the cross section of that for the barrel formed of frustum of cones, is nearly a parallelogram, ($1\frac{1}{4}$ inch by $\frac{5}{8}$ths, out of which the ellipsis is taken, $1\frac{1}{4}$ inch by $\frac{1}{2}$ an inch;) out of the upper part of which about one-fourth of an ellipsis is taken, to form a horizontal bearing for those links of the chain which lie flat upon the tire; the cross section of the latter is a rectangle. Both are rolled into their proper form, and holes of a quarter of an inch diameter punched therein, at a foot from each other, for the purpose of nailing them to the planking of the barrels.

As the method of working chains in grooves has only been in use about three years and a half, it is impossible to give a certain idea in respect to their durability. In all that time not a single link has broke, or the least accident occurred therefrom, though Messrs. T. W. and B. Botfield, have nearly three thousand feet in daily motion at this manufactory. The wear has also been so trifling, that I conceive they will sooner fail from oxydation than attrition: for although the machines for raising coal and ore from the mines are in use twelve hours in the day, the brown oxide of iron formed upon the links by exposure to the atmosphere, is seldom disturbed by the motion of the chain. It is probable, therefore, that in this manner of working, chains will last at least fifteen years, but to be certain we take it at twelve in the

the subjoined comparative statements, which shew that the expence of chains as cordage is only about a twenty-fourth part of that of hempen ropes.

The method of folding wooden barrels with wrought iron tire, does away the necessity of cast iron ones, and may be applied to every wooden barrel now in use at a small expence, as may be seen by the estimate which is subjoined.

There are now at work in the mines of this manufactory, four machines, with wooden barrels folded with wrought iron tire, one cylindrical, and three formed of frustums of cones, raising upwards of eight hundred tons of coal and iron ore per week from pits of about eighty yards deep; and three others are in hand.

I look forward with confidence to the general substitution of chains for hempen ropes at all our mines and manufactories, a matter of importance to the British empire, as it will considerably lessen the consumption of hemp, and render it more abundant for the exigencies of the Navy.

Wishing to give this method of working chains all the publicity in my power, I will obviate all apparent (for there are no real) difficulties which may occur to any person in their application, on his stating them in a letter *post paid* addressed to me here.

I am, Sir,

Your most obedient Servant,

GILBERT GILPIN.

Old Park Iron Works, near Shifnal, 2 Feb. 1807.

To C. Taylor, M. D. Sec.

Expence

Expence of tarred ropes for a machine for raising coal and ore from a pit eighty yards deep, for three years and four months.

	£.	s.	d.
Ten ropes each 110 yards long, 6 inches in circumference, and 5 lbs. per yard, 5500 lbs. at 8*d.* per lb.	183	6	8
Deduct 10 worn out ropes 2750 lbs. at 1*d.* lb.	11	9	2
Net expence of ropes for 3 years and 4 months	£. 171	17	6

Expence of chains for a machine for raising coal and ore from a pit eighty yards deep.

Two chains each 110 yards long, formed of $\frac{3}{8}$ inch iron, 28 links to the yard, and weighing 5 lbs. per yard, 1100 lbs. at 6*d* per lb.	27	10	0
180 yards of wrought iron tire, with the holes punched therein weighing 7lbs. per yard, at 1*s.* 6*d.* per yard	13	10	0
540 Nails for the tire, 27 lbs at 6*d.* per lb.	0	13	6
Workmanship, nailing the tire on the barrel, 180 yards at $2\frac{1}{2}$*d.* per yard	1	17	6
£.	43	11	0

The above chains and tire have been at work three years and four months, and do not appear to be one-fourth worn.

SIR,

SIR,

THIS is to certify, that Gilbert Gilpin has invented a method of raising coal and ore from the mines by means of chains working in grooves, formed by folding wooden barrels spirally, with wrought iron tire, so as to leave a vacancy between each fold for the lower parts of the circumferences of those links of the chains which work vertically to move in, and thereby cause uniformity and safety in motion; four of which machines we have now at work at our mines at this place, one with a cylindrical barrel, and three formed of frustums of cones, which machines, are (to the best of our knowledge) superior to any hitherto known or in use, and will produce the effect at a much less expence.

(Signed,)

T. W. and B. BOTFIELD.

Old Park Ironworks, 6 March, 1807.

To C. TAYLOR, M. D. SEC.

SIR,

MESSRS. T. W. and B. Botfield inform me, that they sent the certificate in respect to the machine for raising coal and ore from the mines, to you yesterday.

You will please to observe, that of the four machines now in use, two only work with *two chains each*, and they are both formed of frustums of cones; the other two, the one with a cylindrical barrel, and the other a frustum of a cone, have each a chain at one end, and a patent flat rope at the

other. We are induced to adopt the latter plan to do away by *degrees* the prejudices which Miners and Colliers have imbibed against chains, from accidents which they havebeen witnesses to in the common way of working. Though the causes of similar accidents are entirely done away by the new method of working, some little of the old prejudice remains; a thing not to be wondered at when we consider the uninformed state of this description of men, arising from a life spent in the dark recesses of mines; and, as it were, cut off from the rest of society.

From the uniformity and safety of the new method, their prejudices against chains are, however, rapidly wearing away, and I have no doubt that in a few years they will even be preferred. It is certainly more reasonable to suppose that this will be the case from the superiority which iron holds in point of strength of materials, than that ropes even should have been known, (at least in the mines,) had the new method of working chains been in use prior to the introduction of hemp.

By excusing the liberty which I am now taking, you will oblige,

Sir,
Your obedient Servant,

GILBERT GILPIN.

Old Park Iron Works, March 7, 1807.
To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. Gilbert Gilpin's improved Machine for raising Coal, Ore, &c. *Pl.* 5. fig. 1, 2, 3, 4.

Fig. 1. *a.* A crank to which the connecting rod is fixed to attach the machine to the steam-engine which works it.

b. A

b. A wheel of 13 teeth, wedged upon the same shaft with the crank, and which works into the wheel *d.*

c. A fly wheel 11 feet in diameter, wedged upon the same shaft as the wheel *b.*

d. A wheel of 64 teeth wedged upon the same shaft as the barrel, into which the wheel *b* works.

e. A wooden barrel, formed of two frustums of cones united base to base, and folded spirally with wrought iron tire, which keeps the links of the chains at right angles with each other, and with the grooves in the pulleys.

ff. The reeling-post and its lever, for disengaging the barrel from the steam-engine, when the men are to be let down into the pit by means of the break.

gg. A break wheel, break and lever, for regulating the velocity of the barrel when disengaged from the steam engine, and in the act of lowering the miners into the pit.

hh. The frame on which the machine is erected.

ii. Fig. 2. The pit-frame, for supporting the pulleys.

k. The pit represented by a circle, part of which is shewn open, and part by dotted lines.

ll. Two grooved pulleys, over which the chains, extending a considerable length from the barrel *a* work in parallel lines.

m. The carriage (called a tacking in Shropshire) on which the coal and ore are landed from the chain at the pit head, moving on four small iron wheels.

nn. Baskets on which the coal and ore are raised from the pits.

o. The hook which goes into the staple of the basket to draw it forward when lowering on to the tacking.

After the basket is lowered, the tacking is drawn forward by two girls to the edge of the frame, which is laid level with the ground on its outside, and near to which the coal

and ore are loaded into waggons, and afterwards drawn upon iron rail-ways to the furnaces, forges, &c.

Fig. 3. A section of a part of the barrel and tire, showing the manner the links of the chain lay on it, on a scale of 3 inches to the foot.

Fig. 4. A section of the pulley, with a link of the chain lying in it.

In a large machine the barrel is fixed 24 or 25 yards from the pit, which is a distance of nine feet in the model sent to the Society.

Although the small chain for the model was made in Birmingham, it is remarkably full of twist, and the links in general awry where they join, in some parts as much as half the thickness of the link. It does not, therefore, keep well in the grooves, or, indeed, will it at all without a weight of 5 or 6lbs. attached to the end of it, and the barrel and frame at the proportional distance of about nine feet from each other.

The SILVER MEDAL *of the Society was this Session voted to Mr.* A. STASS, *No.* 18, *Porter-street, Newport Market, for a Machine for closing Boots and Shoes in a standing Posture.*

The following Communication was received from him; an Explanatory Engraving is annexed; and a complete Machine is placed in the Society's Repository.

SIR,

I BEG leave to acquaint you, that I have invented a machine in which a numerous class of working-men are greatly interested, as it preserves their health, and forwards their work

work with more facility than in their present mode, which hath hitherto required them to sit in a cramped and unhealthy posture. This machine is for the use of boot-closers, harness-makers, army accoutrement-makers, leather pipe-makers, &c. to enable them to perform their work in a standing posture. I invented a machine last year for shoemakers, of which I daily see the happy effects to the labouring class of that trade; and the business of boot-closing, &c, being regarded by medical men as equally injurious, it has induced me to invent this machine, the utility of which has been fully proved by my having closed upwards of 250 pairs of boots on it, and by finding it to answer well for that purpose. I have, therefore, offered it to the consideration of the Society, hoping that by their patronage it may be brought into universal use.

I am, Sir,

Your obedient humble Servant,

A. STASS.

April, 8, 1807.

To C. TAYLOR, M. D. SEC.

Reference to Mr. A. STASS's *Machine for Boot-closing.*
Pl. VI. *Fig.* 1, 2, 3, 4, 5, 6, 7.

Fig. 1. *a*. The clamp or boot-holder, having a cross joint acting within the block *b*, more plainly shewn in the section of the block at Fig. 3.

c. A strong piece of wood firmly fixed in the table, having three holes or mortises to receive the tenon of the block *b*, and thereby to alter the position of the clamp or boot holder; the sloping one is for sadlers-work, the other two

being one over the other are to raise or lower the work to suit the height of the workman; *d d* the lower arms of the boot-holder; *e e* straps from the pedal *m*, joined to the arms by small hooks, by which means the foot being pressed on the pedal, tightens the work in the boot-holder; *f f* a box or table with a drawer under it.

g. A crossing strap, serving for the pedal strap, to be fastened to when the boot-holder is placed obliquely.

Fig. 2. A side view of the boot-holder and block.

Fig. 3. A section of the joint in the block, one arm of the clamp or boot-closer being mortised through the other.

Fig. 4. A side view of the table with a half round arm *h* (mortised into the post *i*), having a strap *k* reaching down to the pedal to hold the work on; *l* another mortise for the post *i* to turn the work the other end foremost.

Fig. 6. A section of the block *h*.

Fig. 7. A plan of the table, showing the two mortises of the post *i*.

The following Persons have given their Testimony to the Utility of the Machine, viz.

JOHN CLARKE JERVOISE, Esq. Hanover-square.
JOHN HAY, Chandos-street, Boot-maker.
EMANUEL VAUGHAN, 4, Clement's-inn, Boot-maker.
JOSEPH PROUD, 46, Bedford-street, Boot-maker.
JOHN WALKER, 21, Vere-street, Oxford-street.
J. LAURIE, Harness-maker, Oxford-street.
FRANCIS POWELL, Chandos-street, Boot-Maker.

TWENTY GUINEAS *were this Session voted to Mr.* CHARLES LE CAAN, *of Llanelly in Wales, for improved Tram-Plates for Carriages on Rail Roads.*

The following Communication was received from him, and an Engraving is annexed.

Specimens of the Tram-Plates and Drawings are placed in the Society's Repository.

SIR,

I HAVE forwarded to the Society of Arts, &c. a specimen of my new method of laying rails, or tram-plates, on such a plan as has met the entire approbation of those who have seen it, and are acquainted with the principle on which such roads should be formed. Rail roads are daily increasing, from the great advantage they afford to those manufactories connected with mines and minerals, particularly to collieries. They also promote agriculture, by occasioning lime to be procured from places almost inaccessible by any other means, or from whence it could be otherwise brought on moderate terms.

I flatter myself that every improvement on this system will be of national importance. The honour I received last year from the Society of Arts, &c. has stimulated me to submit the present subject to their consideration.

I have also sent a drawing of my method of laying the tram-plates, with an estimate of the saving that will arise to the public, by adopting the said method, with necessary remarks on the principle on which it is founded. The leading rail or tram-plate has neither tenon or mortise over the plug. The stop-plate terminates the specimen, which stop-plate should go in with some degree of tightness when laid for actual use, but in the present case that force is not ne-

cessary, as the wooden blocks by a carriage of upwards of 200 miles, may in some small degree be misplaced. I hope any impediment of that nature will be rectified or allowed for. I wish it to be understood, that a stop-rail is intended to be placed at every 30 yards, at which distance any repairs may be made within ten minutes, which by the present mode frequently occupies more than twice that time, exclusive of disturbing in some measure the line of road. By my method, the plate have a certain degree of play, which is absolutely necessary to avoid that breakage which too frequently takes place when they are fixed with nails and plugs.

The plates which I send have been fixed in stone blocks, and are nearly as rough as when taken from the sand. If I am favoured with any mark of the Society's approbation, I shall hold myself bound to transmit such further communications on this subject as may be required by them, or any person desirous of adopting my plan.

I am, Sir,

Your most obedient Servant,

CHARLES LE CAAN.

Llanelly, Carmarthenshire, May 12, 1806.

To C. Taylor, M. D. Sec.

SIR,

I have considered the improvement made by you in the specimen exhibited of a new design of a tram-plate, and am

am of opinion that much advantage may be derived to tram roads, by the adoption of your plan in preventing the temptation of stealing the wrought-iron nails, with which the plates are usually fastened, and by facilitating the operation of laying down new tram roads, and repairing of old ones.

I am, Sir,

Your most humble Servant,

J. VANCOUVER.

Llangennech Park, April 2d. 1806.

To Mr. Le Caan.

SIR,

Several tram-plates on your new method of fixing without either nail or plug have been cast under my immediate inspection, at Stradey furnace. The same may be made with as much ease as any others now in use, and I conceive they will obviate the many impediments that arise from the irregularity of driving the nails. I have no doubt from my observation of yours, but that they will answer extremely well, and prove less expensive.

I am, Sir,

Your obedient Servant,

J. LEWIS.

Stradey Furnace, April 18, 1806.

To Mr. Le Caan.

Certificates

Certificates were also received from Mr. R. JONES of Swansea, Agent to General Ward's Colliery; from Mr. JAMES BARNES, who formed the Mythey and Carmarthenshire rail road, and Mr. EDWARD MARTIN, of Morristen, an eminent Colliery, surveyor and planner of rail roads, all testifying the advantage of Mr. Le Caan's invention.

Reference to the Engraving of Mr. CHARLES LE CAAN'S *improved Tram-Plates for Rail-roads. Pl.* VI. *Fig.* 8, 9, 10, 11.

The Tram-plates, fig. 8 and 9, are fastened by means of a tenon and mortise A B, each having a correspondent bevel, just sufficient to keep the end from rising up, so that the head of one plate confines the end of the other; by this means, the workmen are obliged to form their road in right lines, and maintain perfect levels, as the mortise and tenon confines them to the required exactness necessary to make a perfect road: curves or any given segment may be formed with the same nicety, by having two bevel rails or plates made for such purposes.

Fig. 9. A side view or longitudinal section of the two plates placed on their stone blocks or sleepers C D, show two plugs in dotted lines, one bevel, the other perpendicular, cast in the stop-rail or plate, which is so called as it prevents the others from moving, and when taken up releases all those between the stop-plates; 25 yards of rail road made with these plates, may be taken up and replaced within ten minutes. The plugs in dotted lines are shown in their proper positions within the sleepers E F G.

The usual length of a tram-plate is three feet, the flanch or outside edge H, about one inch and half high, the sole or bed

Mr. Charles Le Caan's Tram Plates.

Fig: 8.

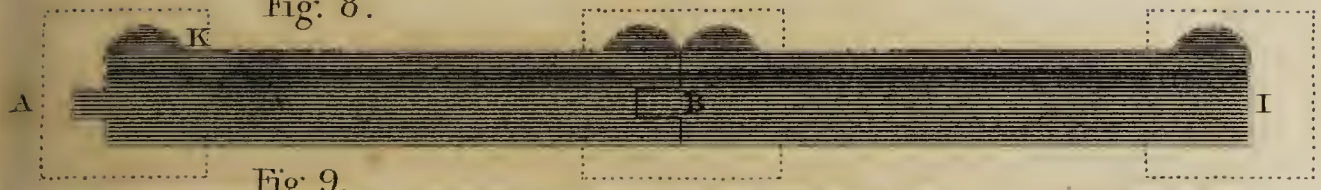


Fig: 9.

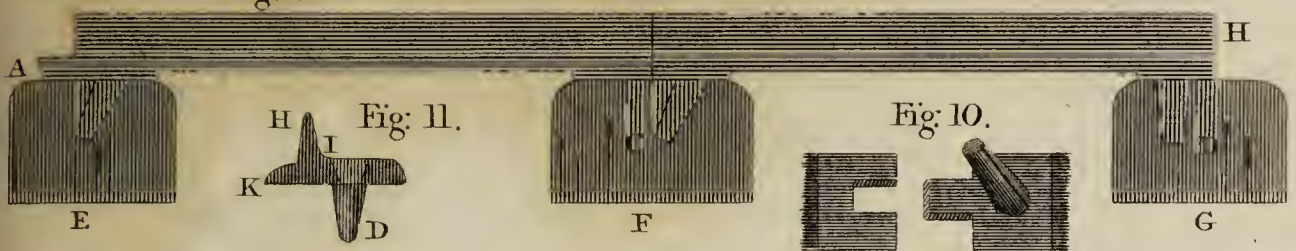


Fig: 11.

Fig: 10.

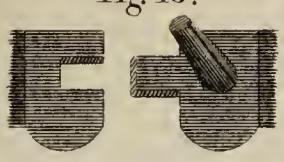
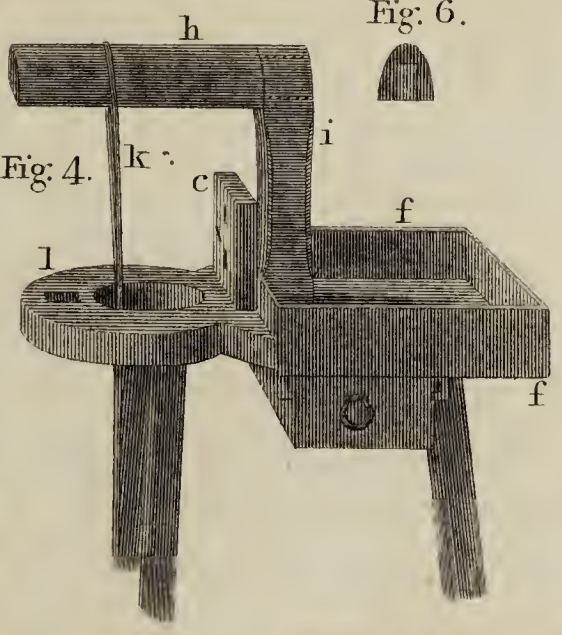


Fig: 6.

Fig: 2.

Fig: 4.



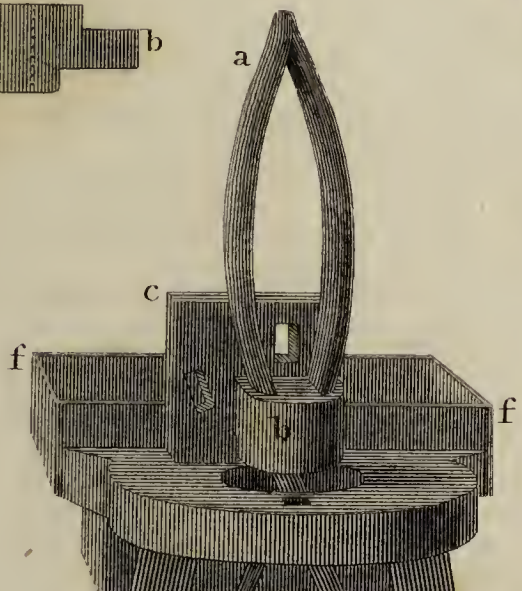


Fig: 1.

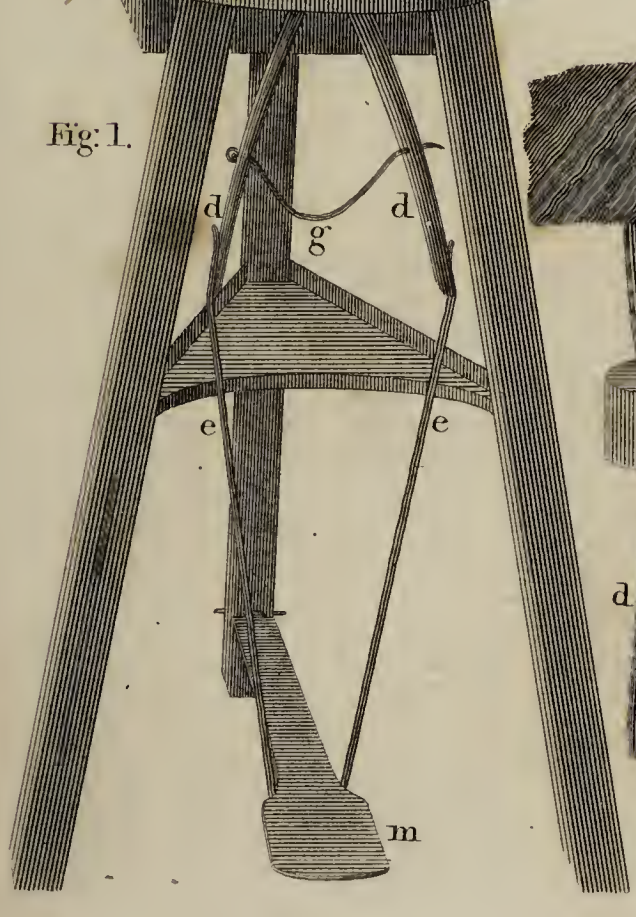
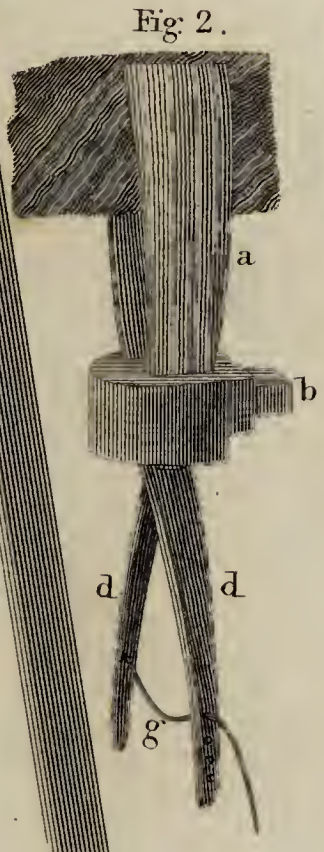


Fig: 2.



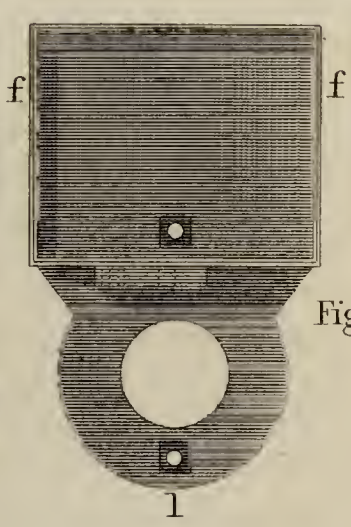
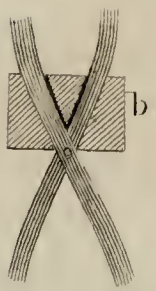


Fig: 7.

Fig: 3.



Mr. A. Staff's Machine for Boot-closing.

C. Varley del.

bed I, from three inches and a half to four inches broad, and three-fourths of an inch thick, but these dimensions may be varied according to circumstances; the most approved weight has been 14 pounds to the foot, or 42 pounds to the plate, the ends from which the plugs project, and to which the tenons and mortises fasten, should be one-fourth of an inch thicker than the other part of the plate.

Fig. 10. A B, Show the under part of the tenon and mortise, and the form of one of the sloping or bevel plugs.

The diameter of the plug near the shoulder is one inch and three quarters, reducing to one inch, its length two inches and a half, forming an angle of eight degrees, the plate from which its projects is counter sunk, so that the shoulder of the plug may not receive any sharp pressure or prevent the plate from having a perfect bearing. There is a small groove in the whole length of the exterior of each plug, to admit a wire to pass to its extremity, to draw the plug out if broken by any accident, also to admit the expansion of water, in case of severe frost.

The blocks or sleepers, E F G, on which the tram-plates are placed, should by no means be less than 120 pounds each in weight, but should be heavier on some kinds of ground: the depth of the hole for the plug should be three inches, and worked according to the inclination of the plug, for which purpose the stone-mason should have a standard cast-iron guage; there should be projections, K, cast with the flanch or outside edge of the tram-plate, as shown at fig. 8, to make the plates lie firm on their sleepers.

Fig. 11. Is a section of one of the ends of a tram-plate, in which H shows the flanch or upright edge, I the flat part or sole on which the wheels of the waggons run, D one of the plugs, K the projection behind the flanch to make the plate lie firm on the blocks.

GENERAL OBSERVATIONS.

The advantages of laying plates on the above principle, is obvious; the blocks being put in their places never sink below their intended level, the act of driving either nail or plug, (which requires a considerable degree of force, and too frequently destroys the level of the road) being here unnecessary. In the common mode of making rail-roads, from the irregularity of nails, particularly in forming their heads, few can be driven exactly even with the plate, and are perpetually obstructing the passage of the waggon; the workmen frequently not proportioning their holes and plugs to the hole in the block, also occasions considerable breakage; the exertion necessary to fix a rail or plate completely, is great, and numbers of plates, particularly when the iron is short or brittle, are broken near the mortices by missing the stroke of the hammer, which must be used with great force.

Advantage gained in laying my Tram-Plates in Comparison with other Modes.

	£.	s.	d.
Nails used in a Mile, 3520 of 3 in the pound, at 4*d.* per lb. - - - -	19	11	0
Nails lost or defective, computed at per mile -	1	0	0
Plugs with their loss - - -	6	5	0
By Breakage of Rails, average from experience	7	10	0
Lessened by labour in Block laying, calculated at only two-pence per yard - -	14	13	4
By Breakage of Blocks - - -	1	0	0
£.	49	19	4

This calculation does not take in annual loss of nails, and breakage of blocks, which is considerable.

The

The Sum of FIFTEEN GUINEAS *was this Session voted to Mr.* JOSEPH COLLIER, *No.* 11, *Crown Street, Soho, for an improved Ship Stove.*

The following Communication was received from him, and an Engraving is annexed.

A complete Model is placed in the Society's Repository.

SIR,

I HEREWITH send you a model of an improved ship stove, which may also be employed in drying houses, &c. with more safety than those in present use.

I submit it to the inspection of the Members of the Society, who, I make no doubt, will see its advantages, and am, Sir,

Your humble Servant,

JOSEPH COLLIER.

P. S. The expence of one twelve inches diameter will be about eight pounds.

Reference to the Engraving of Mr. Collier's Ship Stove, Plate VII. *Fig.* 1, 2, 3, 4.

Fig. 1. The stove, with the front partly closed by the circular slide A, which is moved from the back by the brass handle B. C a moveable plate attached to the slide A, now supported by the latch catching a pin, by which means it acts as a blower to cause the fire to burn more briskly, but which slides down also to shut the fire up.

D another plate, now hanging on its latch, but which

can

can be let down to shut up the ash pit or dish I, which can be drawn out when the side facings FF are pulled up. G a circular plate or cap, which slides so as to shut the chimney up close.

Fig. 2. The body of the stove with the slider A moved round to the back, and thus leaving the fire-place completely open.

Fig. 3. The ash-dish shown separate.

Fig. 4. One of the side facings taken out to show the figure H, which slides into a hole made in the corner of the stove to hold it.

A LETTER OF THANKS *and the* SILVER MEDAL *were voted to the Founder of this Society, Mr.* WILLIAM SHIPLEY, *in the year* 1776, *for his ingenious and humane contrivance for saving the Lives of Persons who fall overboard at Sea, and for presenting a Machine for that purpose to the Society, which is placed in their Repository.*

As this Invention hath not yet been published, and the Society consider it of too great utility to remain unknown, they have ordered it to be inserted in the present Volume, and an Engraving thereof to be annexed.

An Account of a FLOATING LIGHT *calculated to save the Lives of Persons who have the Misfortune to fall overboard in the Night from any Ship.*

GENTLEMEN,

IT is proposed, in order to make this float useful, that it be placed every night under the care of the officers on watch; that its lamp be frequently trimmed and supplied with

Mr. Wm. Shipley's Floating Light.

Fig: 7.

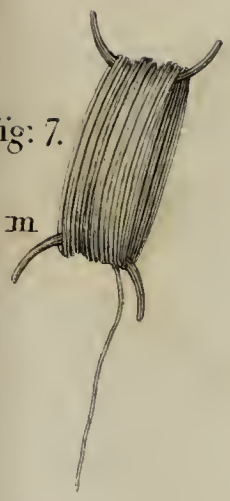


Fig: 5.

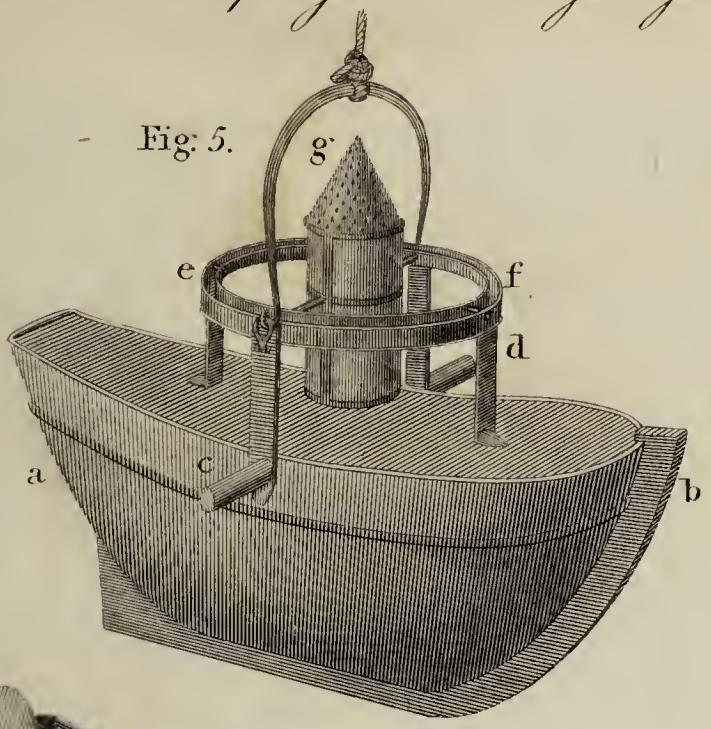


Fig: 6.

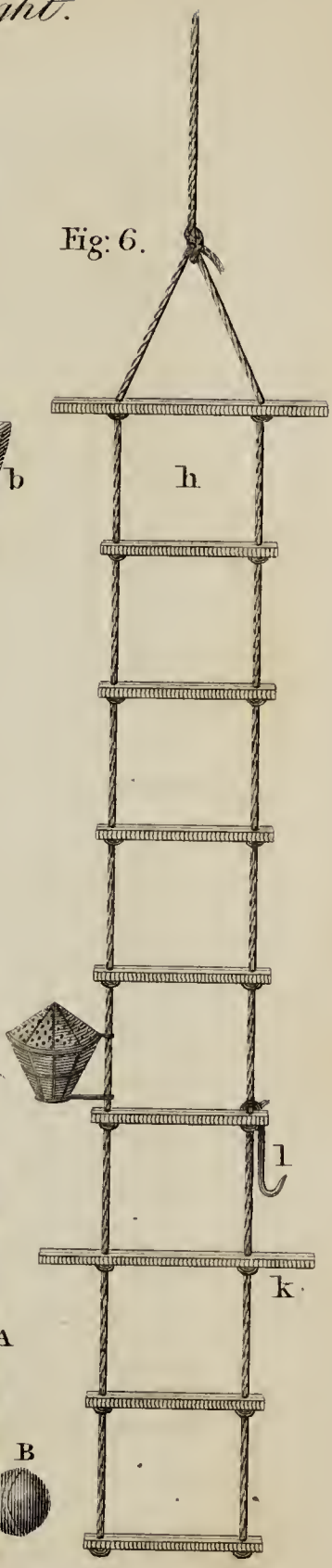


Fig: 1.

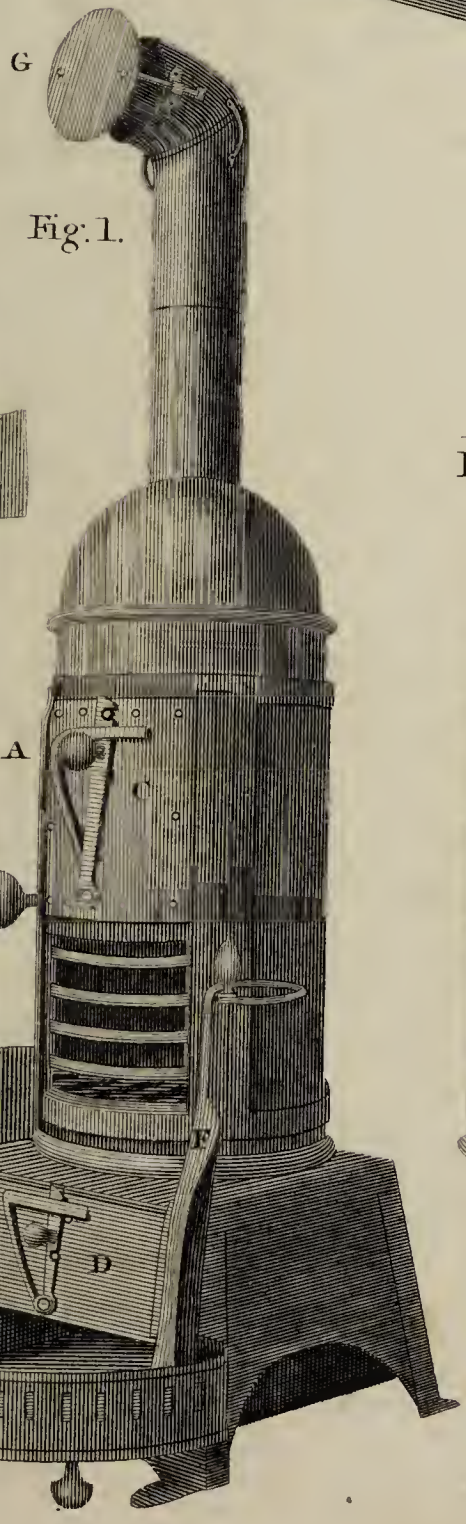


Fig: 4.

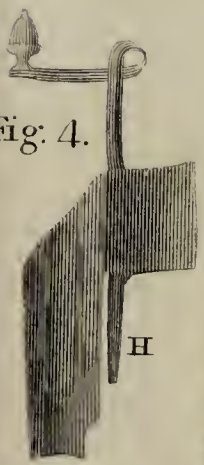
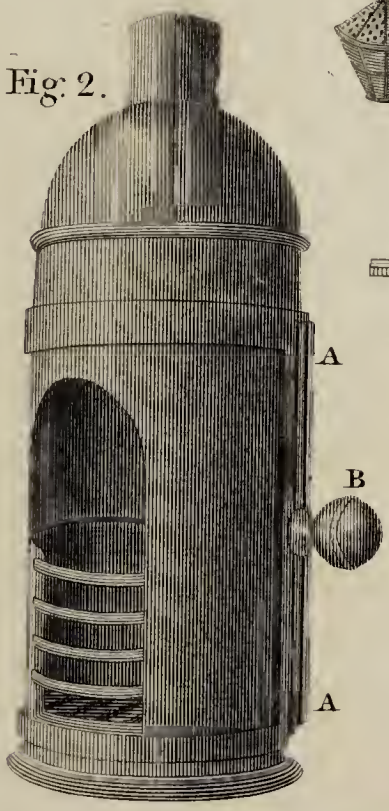


Fig: 2.



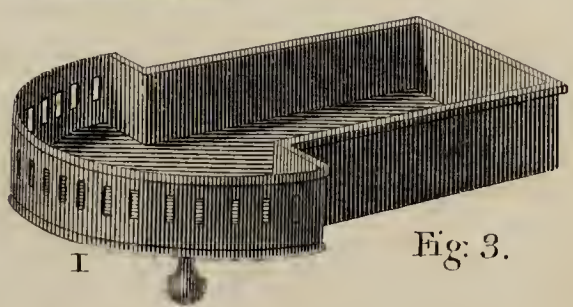


Fig: 3.

Mr. Joseph Collier's Ship Stove.

Farley del.

S. Porter sculp.

with fresh oil, and its wick moistened with oil of turpentine, in order that it may take fire with the least touch of a lamp or candle, and whenever the alarm is given of any of the sailors falling overboard in the night, the officer on watch may light the lamp in the lanthorn belonging to the float as expeditiously as possible, and let the float down by a small cord, wound upon an iron reel, into the water, till it has floated about one second of time, and the float is a little way out of the perpendicular of the small cord. He is then to secure the cord on the reel, to prevent its unwinding, and toss it overboard. The reel will sink down, and pull the line almost perpendicular, and thus it will not be liable to entangle the person when he swims to the float, who, when he has got hold of the handles of it, may move it very fast which way he will, only by striking his legs in the same manner as he does when he swims; and as the light of the lamp will be a certain guide for the person fallen overboard to find the float, so it will also direct them in the ship to find the manand float: And when the ship has tacked about, and is come to the float, then the following method is proposed to take up the man and float into the ship: viz. A lanthorn, with a rope ladder, may be let down by a cord from the ship, till a cross-bar below the lanthorn touches the water, which may be seen by them in the ship by means of the light from the bottom of the lanthorn, and thus the man in the water may lay hold of the cross-bar, and fix his feet on one of the steps of the rope ladder, and he may then lay hold of the iron bar or handle of the float with one hand, and hang it on the hook of the rope, above the cross bar, which being done, the man and float may be both safely lifted into the ship.

Reference

Reference to Mr. Shipley's Floating Light, Pl. 7, Fig. 5, 6, 7.

Mr. Shipley's floating light consists of a hollow vessel in the form of a boat, made of tinned iron plate, *a b*. Fig. 5, Plate 7, the joints of which are carefully soldered, so as to keep out the water. The boat is 27 inches long, 13 broad in the middle, and 12 deep, and is sufficient to support a man in the water. From the gunwale of the boat, on each side, projects a handle *c d*, soldered fast to it for the man to hold by.

e f is a metal ring connected with the boat, by four upright pieces, within which is another smaller ring, turning on pivots, fastened to the ring *e f*, in the direction of the *boat's* length; the internal ring supports a small lanthorn *g*, by an axis which passes through it, and is pivoted into the ring at each end, in the direction of the boat's length. By means of these rings the lanthorn will remain in a vertical position, independent of the boat's motion.

On the first alarm of a man falling overboard in the night, the candle is to be lighted, and the machine lowered into the sea by the rope; if the man should be at a small distance from the ship, he may, by means of the rope, be taken on board immediately on his reaching the machine, if not, the rope may be secured on the iron reel, to prevent its unwinding, and cast off, and the light will direct the man where to find it, and holding fast by the two handles it will support him in the water.

Fig. 6. *h* is a rope ladder, having a lanthorn attached to it, as well to direct the person in the water to the rope ladder, as to enable the persons who lower the ladder to let it down till the cross-bar *k* reaches the water; *l* is a hook to hang the floating light upon. Fig. 7. *m* is the reel for the line, by which the floating-light is to be lowered.

To the Society of Arts, &c.

The Miseries to which Children employed within the Flues in cleansing Chimnies are liable, induced this Society to offer Premiums in the Year 1802, *to obviate the Necessity of so cruel a Practice.*

In the Year 1806, *the Gold Medal was adjudged to Mr.* GEORGE SMART, *of the Ordnance Wharf, Westminster-bridge, for the greatest Number of Chimnies cleansed under his Direction by Mechanical Means, a Particular Account of the Method used by him for such Purpose will be found in the 23d Volume of the Society's Transactions.*

During the present Session, a Gold Medal has also been voted to him for the best Machine produced to the Society for the intended Purpose; an Explanatory Engraving of which having been given in the Volume above-mentioned, renders one unnecessary here.

The following Communication has been received from him, and a Complete Machine is preserved in the Society's Repository for Public Inspection.

SIR,

SINCE the middle of February last, I have been trying experiments in chimney-sweeping; my first was, stiffening a rope with whalebone, but found it would not be portable, and that it would be otherwise inconvenient, as in passing from one room to another in the same house, even with the greatest care, it would be almost impossible to avoid touching the paper on the stair-cases, particularly where they are narrow. In passing through

the street, with such a machine, it would be also very troublesome.

If the brush is made to fill the flue, which ought to be the case, a substance of an elastic nature has not power sufficient when the brush is forty or fifty feet up, especially where there are sharp turns in the flues; the force applied to send the brush up is principally spent in friction on the sides of flues, and of course would soon cut through any flexible substance that combines the whalebone, or other elastic substance used.

My next attempt was to join elastic rods together by screws in the joints, but this plan would not do in passing sharp elbows, as the joints would be strained, and soon unfit for use, and a danger of the joints slipping or breaking, which would leave the brush in the flue.

I then thought of the simple portable machine, I have sent for the inspection of the Society; its cheapness, durability, and power of execution, will, I hope, recommend it. I think with perseverance it will abolish the practice of climbing boys; I have used it in several lofty chimnies, and am convinced it may in time become general. I have also sent a rod and curtain that may be fixed to any opening of a chimney-piece, from six inches to five feet, without using nails or forks in the common mode, to the injury of the wainscot or chimney-piece.

My method of working the machine is, by first putting up the brush, then pressing forward one tube after another as strung upon the rope, till the brush meets with an elbow in the flue; then it is necessary to tighten the rope by pulling it under the feet, or by means of a small pulley, and putting in one of the small screws to pinch the rope; then make a fresh push, and by shifting the two screws, the one to relieve the

the other, it will pass the elbow and possess sufficient stiffness to allow the brush to be forced forward to any height.

I have tried the heath and hair-brushes, and find, that if the flue is well filled, it does not require so hard a substance as heath, as it brings down the mortar with the soot. The brushes of hair, and those formed from the article of which carpet brooms or whisks are made, I think will answer best for general use.

This is to certify, that Mr. GEORGE SMART, of Camden Town, by means of a machine of his own invention for sweeping chimnies, has made two experiments on my hall and parlour chimnies, to ascertain the practicability of raising the machine through their various windings. The first of these flues measures upwards of fifty feet from the hearth, and the operation was performed with apparent ease, sending down a quantity of soot, together with some wet mortar, although the flue had been recently swept by a regular chimney-sweeper. The other from the hearth measures sixty feet, and although there are no less than three elbows in it running in opposite directions, (as the *boy* informs me), the operation was performed within nine minutes.

JOHN TROTTER.

Soho-square, May 2, 1803.

Certificates were also received from Mr. H. W. DIETRICHSEN, of Pratt-place, Camden Town; Mr. CHARLES MILL, No. 4, Gloucester-place, Camden Town; Mr. JOHN MASON, and the Rev. JEREMIAH JOYCE, of Camden Town, testifying that they had seen Mr. Smart's machine at work, and that they approved thereof.

SIR,

I HAVE the pleasure to inform you, that my machine for sweeping chimnies succeeds far beyond my expectation, and that I am not able to attend to one-half of the orders I could have for its use.

His Royal Highness the Prince of Wales, has directed that the chimnies at Carlton-house, also those at the Pavillion, shall for the future be cleansed by my machines. I have also had orders to send to different parts of the kingdom my machines ready-made, where they have been the means of providing a comfortable subsistence for poor persons not capable of other business.

The price of a machine to ascend 60 feet, including rod, curtain, extra brush and box, is 4*l.* 14*s.* 6*d.*

There are two particular advantages attending my machines; namely, that of sweeping a great number of narrow flues which no child can get up, and that of extinguishing chimnies when on fire, by placing a wet cloth over the brush, and forcing it up the chimney.

The construction of the machine is so fully shewn by the description and engraving of it in page 256, of the 23d volume of the Society's Transactions, that it will be unnecessary to say more upon the subject.

I am, Sir,

Your humble servant,

GEORGE SMART.

Ordnance Wharf, Westminster-bridge.
Dec. 21, 1807.

To C. TAYLOR, M. D. SEC.

The

The SILVER MEDAL *was this Session voted to Mr.* JOSEPH DAVIS, *No.* 14, *Crescent, Kingsland-road, for his Machine for cleansing Chimnies, without the Use of Climbing Boys, being considered the Machine next in Merit.*

The following Communication was received from him; an Explanatory Engraving is annexed; and the Machine is preserved in the Society's Repository.

SIR,

I HAD the pleasure of submitting to your inspection, a model of a machine for the purpose of cleansing chimnies, on the 3d of May 1803, and which I wished to be brought before the Society of Arts, being convinced that the approbation of so respectable and enlightened a body of men, would greatly tend towards the superseding the use of climbing boys; and I shall, therefore, feel myself greatly obliged if they would examine the machine, and favour me with their opinion on it.

I am, Sir

Very respectfully yours,

JOSEPH DAVIS.

No. 14, *Crescent, Kingsland-road, Jan.* 6, 1806.

To C. TAYLOR, M. D. SEC.

SIR,

THE brush part of the model of my machine for cleansing chimnies, which I sent you on the 3d of May 1803, not having any hair in it, I am now enabled to forward you one in a more perfect state, and which I had the honour of

using in the presence of his Lordship the Bishop of Durham, at the Military Hospital, Westminster, on the 11th of June 1803, and at the Jennerian Society, in Salisbury-square, Fleet-street, on the 22d of the same month, and in the same year;—a certificate of which signed by the gentlemen who were present, I had the pleasure of sending you. I have also sent three lengths of the rod, (the same as those which were used at the above places,) in order to enable the Committee to judge with greater ease of the construction. Permit me nevertheless to observe, that the principle of my rod is so simple and secure, that it may be used in almost every chimney with safety, either by the maid servant, or a boy of twelve years of age; it is calculated both for private and public use, and a stranger to the machine who used it at the Military Hospital, declared he could sweep any chimney with it, the plan was so good. It will also sweep German and other stove pipes, and flues of almost every description. If the gentlemen of the Society will do me the honour to take the machine into their consideration, I will wait on them by hearing from you, and explain further particulars.

I am, Sir,

Your obedient Servant,

JOSEPH DAVIS.

No. 14, Crescent, Kingsland-road, March 18, 1806.

To C. TAYLOR, M. D. SEC.

Certificate of Approbation of Mr. DAVIS'S *Machine.*

We hereby certify, that we were present and did witness the trial of Mr. Joseph Davis's machine for the cleansing of chimnies,

chimnies, and superseding the necessity of climbing boys, two separate times in the month of June 1803; first, at the Military Hospital, Westminster, on the 11th of that month, and again, on the 22d, at the Jennerian Society, Salisbury-square, and we are of opinion, if this machine was made use of, it would answer the purpose, and, (if not wholly) in a great measure prevent the necessity of the present practice.

B. M. Forster, Threadneedle-street.
Joseph Leaper, 157, Bishopsgate Without.
James Hebdin, Queen-street, Westminster.

SIR,

I am glad that I have had an opportunity of giving my opinion of your machine for cleansing chimnies, which I have done by signing the certificate you brought to me on Monday last. I am opinion, that your machine is capable of sweeping a very great proportion of the chimnies in London and elsewhere; perhaps there are not more than one or two in a hundred which it cannot be raised in. At present, there are (as is well known to all chimney sweepers) some chimnies so small, that boys cannot climb them, so that on the whole, I imagine that your machine will sweep about the same number of chimnies as are swept by boys, though not exactly the very same flues in every instance.

I hope in time we shall convince the public, that they can have their chimnies swept with as much cleanliness and as effectually with machines, as they have heretofore had them

done; and I am convinced that they may be swept as cleanly and effectually, as is commonly done with climbing-boys, so that the difference to the families who employ your machine will be, that they have the same comfort of a clean chimney, and are satisfied that they no longer use a method which is full of horrors and a disgrace to a civilized country.

I remain, Sir,

Your obedient Servant.

B. M. FORSTER.

Threadneedle-street, Oct. 17, 1804.

Reference to the Engraving of Mr. Davis's Machine for cleansing Chimnies, Pl. 8. *Fig.* 1, 2, 3, 4.

Fig. 1. Represents the upper part of the machine; A A A A, are four brushes for sweeping the four sides of the chimney, they are hinged to the bottom of a tube about three inches diameter; B B, show two of the four springs which expand the machine to chimnies of all sizes. The heads of the brushes are made about six inches long, and five wide; and form portions of cylinders, the hair being left longer at the top than the bottom. The hair at the ends of the brushes being left still longer, namely, three and half inches, for the purpose of sweeping the corners of the chimney. C, represents the brush at the top of the machine proper for cleansing the pots; the machine may be used either with or without it, but it is very useful for cleansing stove pipes by being used alone; it is secured to the top of the rod by means of a spring and socket, as

the

the rods below mentioned. D D D D, four lines to draw the brushes near together by a cord E, so that the machine may be forced up the chimney with greater facility. F, the string to expand the brushes when the machine is at the top of the flue.

Fig. 2. Shows on a larger scale the top of one of the rods separate. G, the spring attached to it.

Fig. 3. Explains the manner in which the rods are joined together. H, being a brass socket fixed at the lower end of each rod; the spring G, and upper end of the rod fig. 2, are pressed into this socket so far, that a small point I, on the upper end of the spring, rises through a small hole in the brass socket, and retains the lower rod in the socket. Each rod is made of hiccory wood, which being tough and flexible, is particularly well calculated for this use, bending and adapting itself to the different turns it meets with.

Fig. 4. Shows the key to unlock the rods; it is six inches long and made from a piece of one of the rods, with a steel stud K, in the middle rising a quarter of an inch, and a brass plate on one side projecting the thickness of the rod to guide it into the socket, that it may be used without looking at the rods.

The method of cleansing the chimney is, by first entering the brush part of the machine with the brushes closed, and one of the rods attached to it up the chimney, the head of a second rod is then slided as above-mentioned into the socket of the first rod, and the brush by it forced higher up, a third rod is then slided into the socket of the second, and this mode continued till a sufficient number of rods are added to raise the brush to the top of the chimney. The string E extending from the brush to the bottom of the chimney, being then pulled, occasions the four brushes

to expand to the width of the flue, and to bring down with them in their return all the soot which adhered to the sides of the flue. As the machine is drawn down, the rods are separated one by one by means of the key, and laid upon the hearth till the brush part is brought down, which is then closed and laid with the rods.

The usual precautions must be taken of placing a curtain before the fire-place, to prevent the soot whilst falling from flying about the room.

JOSEPH DAVIS.

TEN GUINEAS *were this Session voted to Mr.* JOSEPH DAVIES, *No.* 14, *Crescent, Kingsland-road, for his Invention to secure the Pannels of Doors and Window-shutters from being cut out by House-breakers.*

The following Communications were received from him, an Engraving is annexed, and a Model is placed in the Society's Repository for the Inspection of the Public.

SIR,

I HAVE for some time considered that it would be of great benefit to the public, if a plan could be adopted to prevent the pannels of shutters or doors being cut out by house-breakers; and having tried a great number of experiments, I have at length succeeded in accomplishing the one I have the honour of forwarding to the Society for the Encouragement of Arts, &c.

This improvement consists in introducing tempered steel

Mr. Mendham's Escapement.

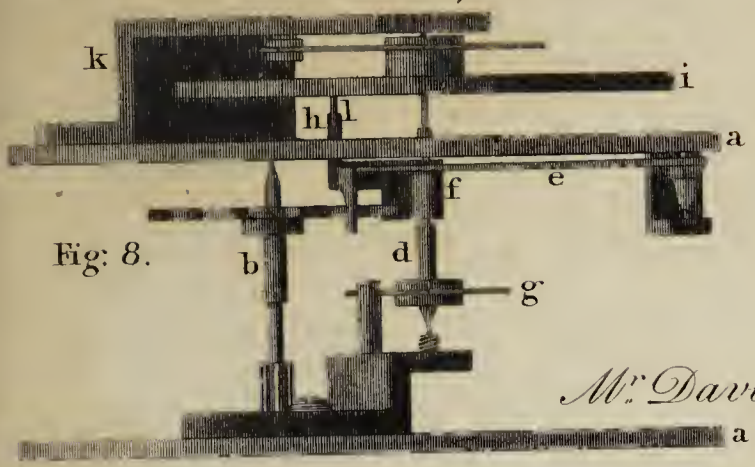


Fig: 8.

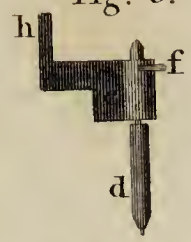


Fig: 9.

Fig: 4.

Mr. Davis's Chimney Brush.

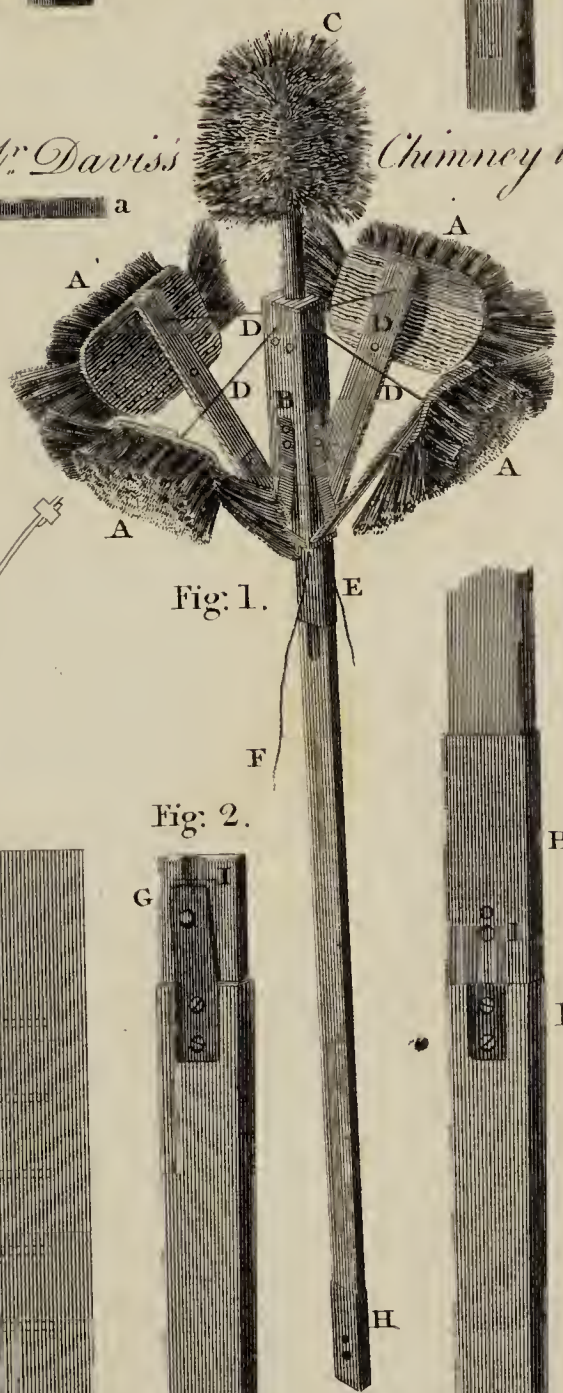


Fig: 1.

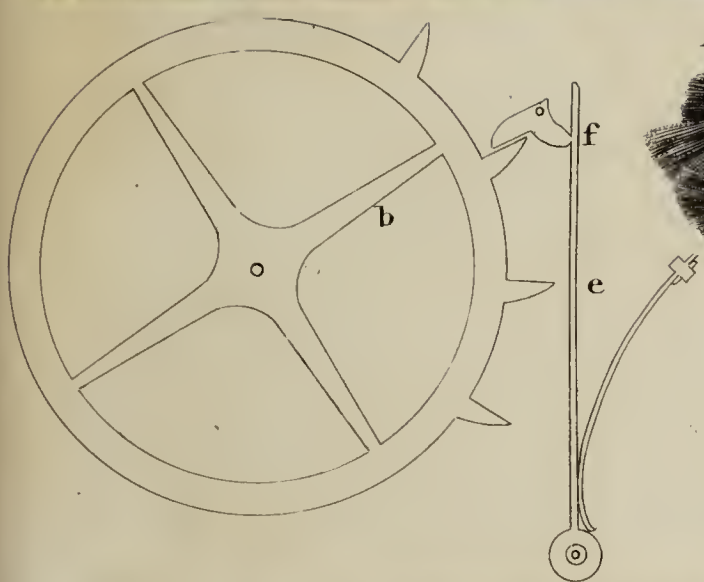


Fig: 2.

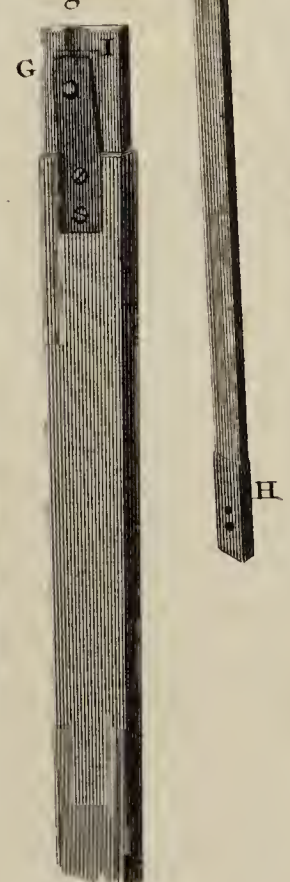


Fig: 3.

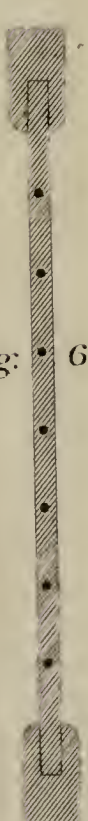


Fig: 6.

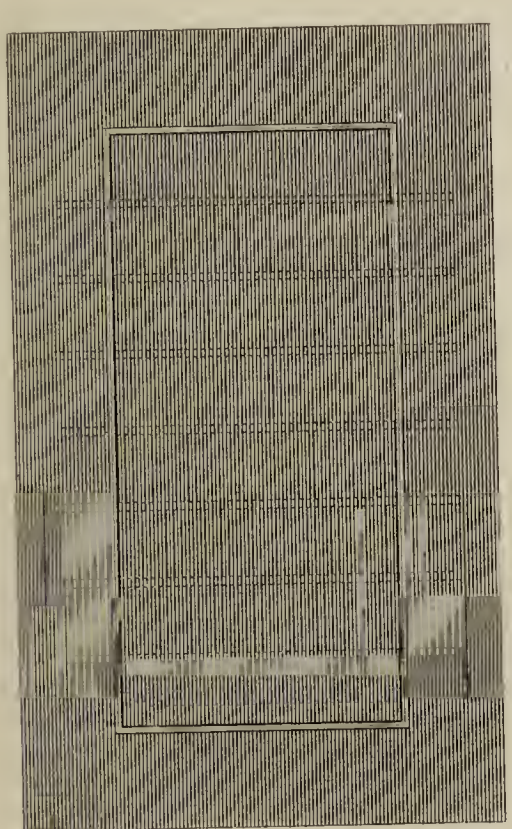


Fig: 5.

Fig: 7.

Mr. Davis's Pannels for Security.

C. Varley dd.

S. Porter sculp.

steel wires through the pannels and stiles at the distance of three inches, thereby not only making a door or shutter far superior in strength, but calculated to defy the attempts of the house-breaker in taking out a pannel. This improvement, though so far superior to any hitherto known for appearance and utility, will be attended with less expence. I have submitted the above plan to Messrs. Paynters, Coleman-street, likewise Messrs. Moffatt and Co. Paternoster-row, and to several gentlemen in that line of business, who all do me the honour to say, that it far surpasses any thing of the kind, that they have ever known or conceived, and that it will completely answer the purpose.

I have also sent the machine on which I bored the pannel, conceiving it to be an additional recommendation; with this machine, a boy may with ease bore the shutters, &c. which other ways might be difficult for a man to accomplish.—I have the pleasure most respectfully to subscribe myself,

SIR,

Your very humble Servant,

JOSEPH DAVIS.

No. 14, *Crescent, Kingsland-road,*
April 14, 1807.

To C. TAYLOR, M. D. SEC.

CERTIFICATE.—We hereby certify, that Mr. Davis's improvement on doors and shutters, to prevent the pannels from being cut out by house-breakers, is the best that we have ever seen; and we are of opinion, that its being known will be an advantage to the public, and do therefore recommend

mend it to the Society for the Encouragement of Arts, Manufactures and Commerce, for their consideration.

F. PAYNTER, and Co. Coleman-street.
E. COLEBACH, Minories.
J. TEASDALE, Paternoster-row.
W. ROLFE.

April 22, 1807.

Reference to the Engraving of Joseph Davis's Invention for securing Window and Door Pannels. Pl. 8. *Fig.* 5, 6, 7.

Fig. 5. Represents a wooden pannel made in the common way, the dotted lines show the situations of the tempered steel rods within the pannel, the holes through which the rods were introduced on one side being closed up.

Fig. 6. Shows a section of the same, the small dots in the engraving, denoting the place of the rods.

Fig. 7. Shows the instrument on which the pannels are laid to be bored. The borer passes through the holes L M of the two upright pieces which keep the borer in a straight line to act upon the pannel laid upon the frame N.

The SILVER MEDAL *of the Society was this Session voted to Mr.* S. MENDHAM, *Counter-street, Borough, for a Watch Escapement.*

The following Communication was received from him, an Explanatory Engraving is annexed, and a Model is preserved in the Society's Repository.

SIR,

I BEG leave to lay before the Society, a model of a new escapement, the principle of which is, that the balance acts without

without friction, and the movement in itself very simple; the impulse is given without jarring, the inequality of power through the train, has no perceptible effect on the balance; and no additional weight, however great, can produce more than a regular and gentle increase of impetus on the balance.

I remain, Sir,

Your most obedient Servant,

S. MENDHAM.

7, Counter-street, St. Margaret's-hill, Borough, Sept. 21, 1805.

To C. Taylor, M. D. Sec.

SIR,

Having attended the Committee upon Mr. Mendham's escapement, I think it a justice due to a man of genius, to give my opinion further upon it.

In viewing mechanical improvements, we should not confine our ideas to their present properties, but should consider what improvements the principle will admit of.

As the principles of Mr. Mendham's escapement, and that of Mr. Mudge's, which obtained a bounty from government, are much the same, I shall compare the one with the other.

The impulse given to the balance without friction, is exactly the same as Mudge's. The remontoir is bent up by the maintaining power in a similar way to that of Mudge's, but from the form of the pallet, which is a plain surface,

surface, it is not so perfect. Mudge's, from the form of the pallet, bends the remontoir always to the same place, the other is bent higher or lower according to the force of the maintaining power, but by forming the pallet like Mudge's it would render them alike in that respect. The only other objection is the spring detent that detains the wheel, when it drops from the pallet of the remontoir; it is the same as that of a detached escapement, consequently exposed to the whole force of the maintaining power. To compensate for these objections, the arc of vibration is not limited like Mudge's, which is of great importance, and having only one remontoir, it is more simple. It is, therefore, superior to Mudge's in having only one remontoir, and being unlimited in the arc of vibration, it is superior to the detached escapement in giving the impulse without friction.

I am, Sir,
Your very humble Servant,
THOMAS RAMSAY.

Islington, Feb. 11, 1807.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. S. Mendham's Escapement. Pl. 8. *Fig.* 8, 9, 10.

In the escapement referred to, there are two principal peculiar properties in the invention, both which I consider superior to any thing of the kind laid before the public; first, the balance is kept in motion without any friction whatever, and in a manner so simple, that even movements of inferior workmanship must go with great accuracy.

Being not in this line of business, or acquainted with any persons in the trade, where I might have had an opportunity

nity of examining different escapements, I certainly labour under many disadvantages, for since I have been honoured with the Society's medal, I have heard of an escapement by which the balance is kept in motion without friction, but being limited in the arc of vibration, complicated, and very expensive in the movement, it renders it much inferior to mine.

In the second place, the balance is kept in action by an impelling power without any blow whatever; all other escapements which have fallen within my notice have kept up the vibration by a direct blow virtually on the balance itself, which I have always considered to be a great disadvantage, for a blow upon any thing of the nature of a spring, produces that kind of shock which can by no means be convenient or serviceable in keeping a steady motion, which is so essentially necessary, but is on the contrary disadvantageous.

The figure, plate 8, fig. 8, represents the escapement without the rest of the train; *a a* are the two plates of the frame between which the train runs; *b*, is the last or balance wheel of it, with teeth nearly similar to that of the balance wheel of an eight-day clock, moving with the flat face of the tooth forward against the pallet *c* of an upright spindle *d*; *e* is a locking spring nearly similar to a detached one, having no extra spring to pass to and fro with. Above the pallet *c*, is a very small one, *f*, which is for the purpose of unlocking the wheel, which is better shewn in fig. 9; at the lower part of the spindle *d*, is a hair spring *g*, so pinned as to bear the pallet *f* against the locking spring with sufficient power, so that of its own accord it frees the wheel and lays the pin *h* which comes through the plate gently up to the stop, consequently the tooth falls upon the pallet *c*,

but

but so close home to the centre of the spindle, that it has no power to pass it of its own accord; the pin *h* referred to, is fixed to the top extremity of the pallet *c*, and rises perpendicularly through the plate *a* some way above the surface.

The balance *i* is fixed on the centre of its spindle, principally on account of equalizing the weight, besides which it is the most convenient to be so; it is supported between the plate *a*, and the cock *k*, precisely over the spindle *d*, consequently the action of each is in the same arch, and the connection is between the pin *h* of the pallet, and the pin *l* of the balance, (a pin fixed in the balance at the same distance from its centre as the pin *h* is from the centre of the spindle *d*, and sufficiently long to touch the pin *h* sideways,) there is therefore no friction whatever between them.

Having mentioned the different parts of the escapement, I shall proceed to explain its action. The immediate course of vibration is from the spring *g*, the balance spring is so placed that the pin *l* of the balance stands near the pin *h* of the pallet; it is to be remembered that the tooth of the wheel rests on the pallet during the vibration of the balance, so that when the balance is put in motion, the pin *l* comes in contact with the pin *h*, which stands perpendicularly almost imperceptibly fine, and carries it back; as soon as moved, the tooth of the wheel gives it an extra assistance of about one-fifth of a circle, passes and lays the next tooth on the lock; on the return of the balance, the spring *g* applies all its power in urging the balance forward till it comes to the stop, the balance then maintains its motion, and the small pallet *f* having unlocked the wheel, the tooth falls again on the great pallet *c*, and waits the return of the balance.

The balance carrying the piece *h* back, forms a most admirable

admirable banking without any extra apparatus, which is generally done by some kind of stop on the hair spring, which must have an irregular effect; the further the pin is carried back, the stronger the spring operates against it, and from the extent where the piece may be forced back to, there is play for near two whole circles of vibration, without any possibility of upsetting. The balance of the model vibrates about a circle and one third with extraordinary freedom, *though* a course train of four wheels, a large and heavy balance, with only the power of a stout watch spring. I therefore think the power necessary to carry a train with this escapement, may be considerably less than any other of a detached nature.

Fig. 9. Represents the axis *d* shewn separately, in order that the arm and pin *h*, and little pallet *f*, may be seen more distinctly.

Fig. 10. Shows the balance wheel *b*, and the method of locking and unlocking.

S. MENDHAM.

The SILVER MEDAL *of the Society was this Session voted to Mr.* WILLIAM HARDY, *No.* 13, *St. John-street, opposite the Dispensary, Clerkenwell, for equalizing the long and short Arcs of Vibration in Time-keepers.*

The following Communication was received from him, an explanatory Engraving is annexed, and a Model of the Invention is preserved in the Society's Repository. See Plate 9. *Fig.* 1, 2, 3, 4, 5, 6.

SIR,

THE equalization of the time of the different arcs of vibrations of the balance of a time keeper, having lately

given to rise much discussion, I beg leave to offer for the approbation of the Society, three different modes of obtaining this end. The first method is by a straight spring placed edge-ways across the diameter of the impellent pallet *a*, fig. 2 and 3, and screwed at the end opposite to the direction of the wheel, on its approach towards the centre of this pallet; at the other extremity of this spring is a flat face, or curved surface, to receive the approaching tooth of the escape wheel, which gives the impulse; this spring acts between two pins placed in the pallet near its end. By reducing this spring to a certain degree of strength, so that it may yield a little to the force of the wheel in giving the impulse, the different vibrations will be performed in the same time; but the proper degree of strength can only be determined by repeated trials. This method possesses besides, this farther advantage, that the acting surfaces are not so liable to be injured by the drop of the wheel upon the spring, as upon a solid surface, nor the vibrations of the balance so much disturbed by the impulse. The second method is by a straight spring *b c*, fig. 1 and 4, screwed to the under part of the cock, placed edgeways and diametrically over the cylindrical spring, and having a piece cut out to clear the arbor of the balance. This straight spring is at one extremity fastened to the end of the pendulum-spring, and, at the other extremity, its elasticity is reduced so as to yield a little before the pendulum-spring operates; on the opposite of the cock, where the spring is screwed, is fixed a stud *d* projecting downward, and having a slit to admit the small piece at the end of the spring *b*; on each side of this slit is an adjusting screw *e e*, whose points face each other, and are placed so as that the spring may move equally between them from its point of rest. The action of the spring

between

between the adjusting screws, requires to be somewhat less than the angle of escapement. Let the balance be made to vibrate, so that the straight spring may move up to the adjusting screws upon each side, and no farther, being weaker than the pendulum-spring, its exertion will be less; hence the time of the vibrations will be prolonged, but as they increase, the exertion of the pendulum-spring will commence and progressively accelerate them, and this acceleration will always be in proportion as the exertion of the pendulum spring is to the action of the straight spring between the two adjusting screws. Thus it will always counteract the accelerating effect of the escape-wheel in the small arcs of vibration, so that the whole of them shall be performed in the same time. The third method is by connecting a piece of short spring-wire to the pendulum-spring, by a small piece *f*, fig. 5 and 6, with two holes, and pinning the two springs together about half a turn from the stud of the pendulum-spring, and clamping the other end of the short spring at its natural point of rest to a sliding piece, g, which projects out from the pendulum-spring stud. By this manner of fastening, both springs will act together, and each will retain their natural point of rest; but by moving the sliding piece, which clamps the end of the short spring, and placing the spring a little on the strain, in opposition to each others exertion, the point of rest of both springs will be destroyed. Thus by producing this counteracting force in the two springs at the lowest point of vibration, the accelerating effect of the escape wheel upon the balance in the small arcs of vibrations will be corrected, thereby the whole of them will vibrate in equal time.

I am, Sir,

Your obedient humble servant,

No. 13, St. John's-street, Clerkenwell. WILLIAM HARDY.

To C. Taylor, M.D. Sec.

Extract from Captain William Brown's Letter, addressed to Mr. John Nichols, Millpond-bridge, Bermondsey.

Respecting the chronometer which I purchased from Mr. William Hardy last year, the jolting of the coach in the conveyance to Liverpool, altered its rate of going to 34″ slow, which rate it continued so exactly, that in making Cape De Verd, on the coast of Africa, (the longitude of which has been correctly ascertained) in 24 days from Liverpool, and carefully measuring my distance to the Cape, I could not discover it to have deviated from that rate, say 34″ slow, not one second in the whole time; and I have every reason to believe, that it continued the same rate until my misfortune, when it got immerged in sea-water, having lost my ship on a shoal five or six leagues from the Riopongas, this dangerous bank not being laid down correctly, nor the latitude nor longitude given in order to avoid it.

Liverpool, April 26, 1807.

To Mr. W. Hardy.

The Silver Medal *of the Society was this Session voted to Mr.* Henry Ward, *of Blandford, in Dorsetshire, for a Compensation-pendulum for a Clock or Time-piece.*

The following Communication was received from him, and an explanatory Engraving is annexed.

A complete Pendulum, and Drawings thereof, are placed in the Society's Repository.

SIR,

Herewith I send you a new compensation-pendulum, which I beg you will lay before the Society of Arts for their

their inspection. I trust their liberality will be equal to the advantages that may be seen to result from it, together with their consideration of the pains I have bestowed in making it. It has me cost much labour, time, and expence, indeed, it has occupied almost the whole of my attention for the last nine months.

If any objections should be made to it, I will endeavour to answer them, and make any further experiments required.

I am, Sir,

Your obedient Servant,

HENRY WARD.

Blandford, March 8, 1806.

To C. Taylor, M. D. Sec.

Reference to Mr. Ward's Compensation-Pendulum.
Pl. 9. *Fig.* 7, 8.

Fig. 7. *h h i i.* Are two flat rods of iron or steel, about half an inch wide, and an eighth of an inch thick. *k k* Is a rod of zinc interposed between them, and is nearly a quarter of an inch thick. The corners of the iron rods are bevelled off, that they may meet with less resistance from the air; and it likewise gives them a much lighter appearance. These three rods are kept together by means of three or four screws *l l l l*, which pass through oblong holes in the bars *h h k k*, and screw into the rod *i i*. The rod *h h* is connected to the one *k k* by the screw *m*, which I call

the adjusting screw. This screw turns in the rod *h h*, passes through the zinc rod *k k*, and screws into the iron rod *i i*. The rod *i i* has a shoulder at its upper end turned at right angles, and bears on the top of the zinc rod *k k*, and is supported by it. It is necessary to have several holes for the screw *m*, in order to adjust the compensation. See fig. 8.

Now it is evident, that if any degree of heat or cold be applied to this compound rod, that the one of zinc expands and contracts as much as the two iron ones together; the distance from the point of suspension to the centre of oscillation must remain the same.

In proportioning the length of the rods, I made use of Mr. Smeaton's table of expansion of metals, in the 48th Vol. of the Philosophical Transactions: where he shews, by experiments made with a pyrometer, that the expansion of iron is to that of unhammered zinc, with the same degree of heat as 151 to 353, and to that of zinc hammered, half an inch per foot, as 151 to 373. This great expanding property of zinc renders it in theory extremely fit for the purpose of compensation in a pendulum, and I was desirous of knowing if it would answer in practice, and likewise the exact proportion that was requisite to answer the intended purpose.

I made two regulators whose pendulums were composed of iron and zinc, as above described, with this difference, however, that one had a detached scapement of a particular construction; the zinc rod was not hammered, the ball of a lenticular form, and weighed twenty pounds, its arc of vibration nearly five degrees. The other had a simple remontoiring scapement, the zinc rod was hammered half an inch per foot, the ball, of a spherical form, weighed forty six pounds, and vibrated two degrees and three quarters.

These

These regulators were both placed in the same room, and their cases firmly fixed to the wall; the pendulums were suspended from a stout brass cock, screwed to the back of their respective cases. In the inside of each case, and immediately behind the pendulum rod, was hung a thermometer, for the purpose of comparing the degrees of heat. I adjusted them to mean time nearly by corresponding altitudes of the sun. After having compared them together for several days, I found that the one which had the hammered zinc rod went somewhat faster when the air of the room was heated by a fire in the grate than the other did. Hence I concluded that the difference of expansion of hammered and unhammered zinc was greater than Mr. Smeaton made it, at least it appeared so in this instance.

But to determine whether the length of the hammered zinc rod was accurately proportioned to that of the iron ones, I wished next to prove, without waiting that length of time that nature would require to produce a sufficient alteration in the temperature of the air, I proceeded to make the following experiment: I caused to be made a tin tube six feet long, and two inches and a half diameter at its larger end, from whence it gradually tapered to the other, which was only half an inch diameter. Within the case, and as far from the pendulum as possible, I placed this tube; the smaller end was carried through a hole in the top of the case, and projected a few inches above it. In the lower end of the tube was inserted the nozzle of a lamp, and immediately under it, in the bottom of the case, was a hole of an inch diameter to supply the lamp with air. By this means the tube would communicate as much heat to the internal air, as to raise the thermometer about thirty-five degrees.

Previous to the lamp being put in the case, I made both

pendulums vibrate exactly together, and after an interval of twenty-four hours, the one with the hammered zinc rod had gained, as near as I could judge, one tenth of a second. The mean height of the thermometer was fifty-three degrees. I now lighted the lamp, and in about four hours every part appeared to be thoroughly heated, and the thermometer arrived at its maximum, which was eighty-eight degrees; at this point it continued with little variation. While the heat was increasing I found the motion of the pendulum was accelerated. I again made them beat exactly together, and in about ten hours after, the heated pendulum had gained one second; the thermometer in the other case continuing nearly the same. The lamp was then taken out, and as soon as the parts were cooled, and both thermometers shewed the same degree, I adjusted the beat of the pendulums as before, and, at the end of twenty-four hours, I found the pendulum that had been heated kept precisely the same rate as it did before the experiment was made.

By this experiment the zinc rod was evidently too long, and that b y a considerable quantity. The pendulum was then taken down, to have more holes made for the adjusting screw, and after many repeated trials with the lamp and tube, as before, I found the length of the zinc rod to be 22 inches, and consequently the length of the iron ones together $39{,}2 \times 22 = 61{,}2$ inches, or, the expansion and contraction of iron to that of zinc hammered, half an inch per foot, as 151 to 420.

Having thus far satisfied myself with the hammered zinc rod, I proceeded to make similar trials with the one that was unhammered; in doing which a circumstance occurred that I cannot account for, that when the air in the case was rarified by means of the lamp and tube, the arc of vibration

vibration would be about half a degree less than it was before the lamp was applied, which is directly contrary to what I should expect would have taken place. I afterwards found that the other pendulum was affected the same way, but in an extreme small degree, which, without doubt, was in consequence of the ball being much heavier, and vibrating a smaller arc. In taking the rate of the clock when the lamp was in the case, I at first computed from theory the error that would arise by such a dimunition of the arc, and allowed for it accordingly; but doubting whether the unlocking of the swing wheel might not form a decrease of velocity in the pendulum, and have a greater tendency to retard its motion, I therefore thought the experiment would be rendered more accurate if the maintaining power was increased until the arc of vibration should be the same. After several trials I found the length of the unhammered zinc rod to be about twenty-nine inches, which agrees pretty nearly with Mr. Smeaton's experiments; that is, in regard to the relative expansion of iron and unhammered zinc.

The zinc rod of the pendulum, which I here send to the Society of Arts, was hammered three quarters of an inch per foot; and by making experiments with it as I had done with the other two, I found the length of it to be twenty-two inches, which is exactly the same length as the one that was hammered half an inch per foot, so that it seems nothing is gained after hammering it to a certain degree; but I cannot think that any rule can be laid down to enable us to judge of the degree of expansion that will take place with a determinate increase of heat, from the quantity that is extended by the hammer; much depends on the degree of curvature and polish of the stake and hammer, and probably on the heating of the rod at the time;

for

for it is necessary to heat it a little hotter than boiling water, otherwise it will crack in hammering.

In all these experiments it is to be understood that the ball of the pendulum was suspended by its center; but if the ball be made to rest on its lower edge, the expansion and contraction of it must be taken into consideration.

It has been the opinion of some mechanists that zinc is an unfit substance for a compensation-pendulum, because they have thought it too soft for the purpose, and that after being heated or cooled to a considerable degree, it does not return to its original dimensions. If that was really the case, no doubt but it would be a general one common to all metals in a greater or less degree; but from the experiments and observations I have made on zinc pendulums, I am fully satisfied there is no foundation whatever for such an opinion. Some time in the latter part of last summer, I however noticed a circumstance that made me doubt the matter—for when I first used any zinc pendulum, I never could bring the clock to keep the same rate two days together, but that it was continually retarded, whether I used the lamp or not; and had I not before observed a similar effect on a lever pendulum that was made of brass and steel, I should have ascribed the cause wholly to the softness of the zinc rod; but by constantly comparing its daily rate with one that had been going a longer time, I found this retarding property gradually wore off, and in less than a month would become quite settled to the rate that it would afterwards keep. By subsequent experiments with the lamp too, I have constantly found that all the pendulums I have hitherto tried kept precisely the same rate, both during the time they were heated (provided they were properly adjusted) and afterwards,

terwards, as they had done before. The cause of this retardation appears to me to be, that the points of contact of the different pieces, which compose the pendulum, are more closely connected after a little time than they are at first, that is, those points of contact do, by the weight of the ball, yield to each other in a smaller degree, until they get a broader bearing.

The advantages of this pendulum are, 1st, that from its simplicity it will never fail to have the desired effect. 2ndly, That no extraordinary care is requisite in executing it. 3dly, That the compensation may be increased or diminished with the greatest ease, without stopping the clock more than a minute, by making fast one of the screws that keep the rods together whilst the adjusting screw is removing, taking care to release it again afterwards; and, 4thly, That it can be manufactured for less expence than any other compensation-pendulum hitherto published.

N. B The compensation of this pendulum which I now send to the Society of Arts is properly adjusted, at least very near the truth. The holes for the adjusting screw are made at such a distance from each other, that by removing the screw one hole, it will produce an alteration in the going of the clock of about a quarter of a second per day with a change of thirty degrees of Farenheit's thermometer.

SIR,

SIR,

PERMIT me to state to you the observations I have made since my compensation-pendulum was laid before the Society.

The regulator, with the hammered zinc rod, and ball of forty-six pounds weight, was firmly fixed to a brick wall at the top of my house. The adjustment of the length of the rods, by means of a lamp, was repeated as before. There was, however, an alteration necessary to be noticed; the ball of the pendulum rested on its lower extremity, instead of being suspended by its centre. I prefer this method, as being less liable to error if the rods should be affected by heat or cold, quicker than the ball. The length of the zinc rod, as ascertained by the lamp, was now found to be $20\frac{1}{4}$ inches.

The clock was then set to mean time, and suffered to go without alteration; the result is exhibited in the following table.

1806	Error of Clock at time of observation.	Number of Days between the Observation.	Daily rate
March 21	0″ 0	18	× 0″, 15
April 8	× 2, 8	32	— 0, 18
May 10	— 8, 7	16	— 0, 80
26	— 21, 5	26	— 1, 10
June 21	— 50, 0		

Increased the compensation for heat and cold, 6 holes $= 4\frac{3}{4}$ inches, or, the length of the zinc rod 25 inches. The clock was again set to mean time.

July

Fig: 1.

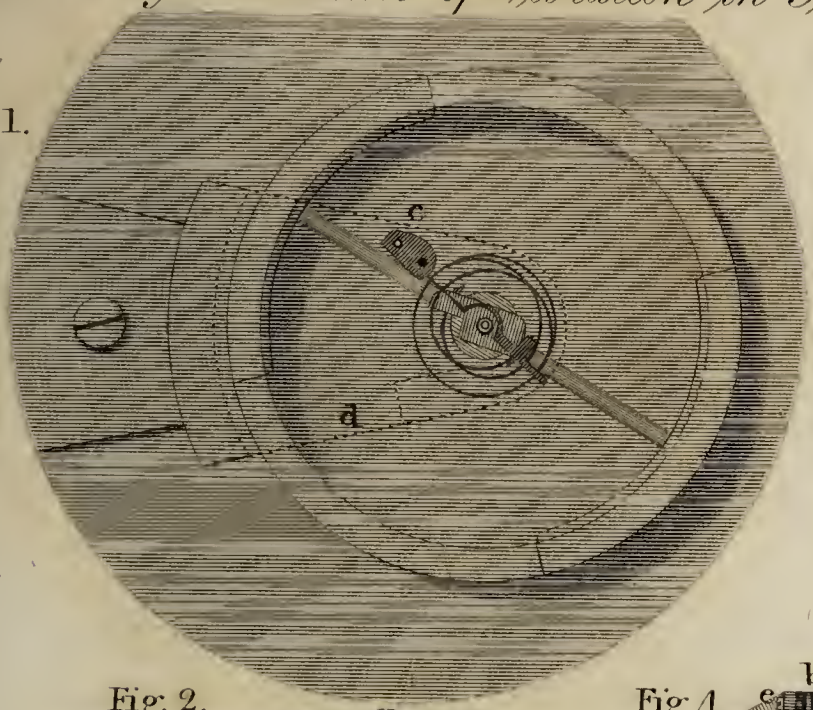


Fig: 2.

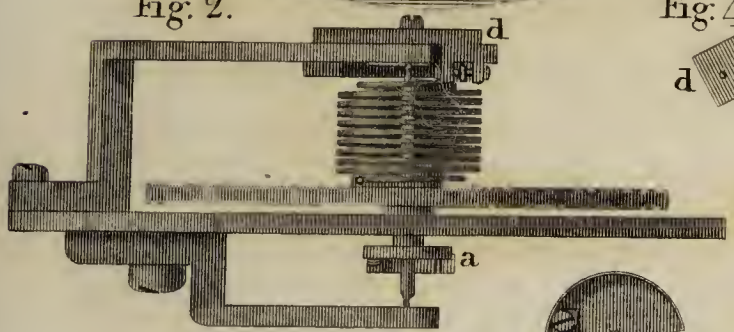


Fig: 4.

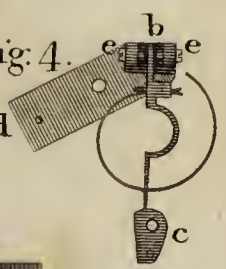


Fig: 3.

Fig: 5.

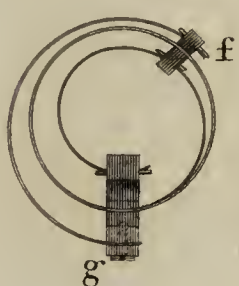


Fig: 6.

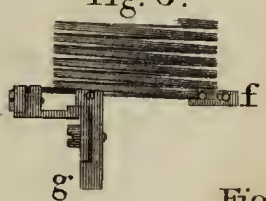


Fig: 9.

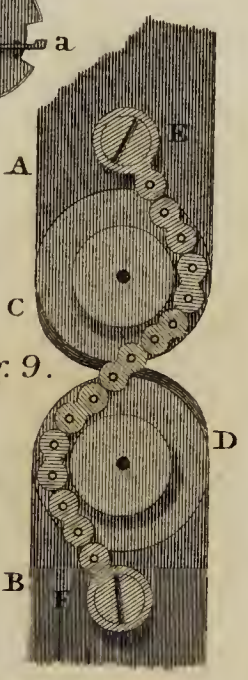
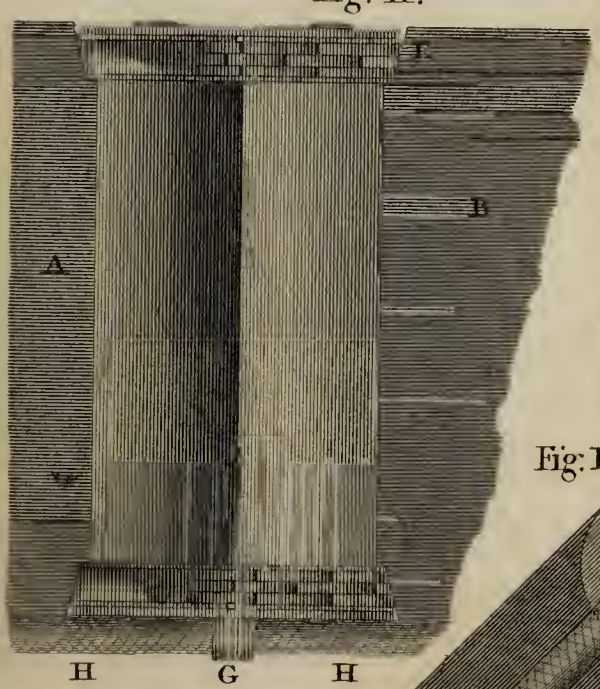


Fig: 11.



Mr. Furniss's
Air Tight Door Hinge.

Fig: 10.

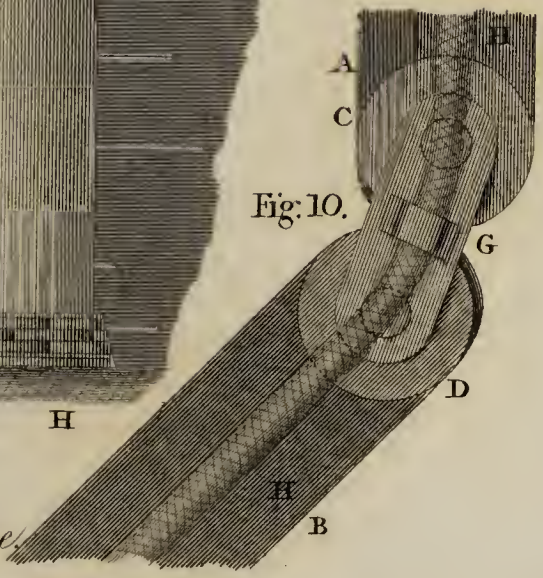


Fig: 7.

Fig: 8.

Mr. Henry Wards' Compensation Pendulum.

C. Varley del.

S. Porter sculp.

July 1	0″, 0	26	— 0″, 36
27	— 9, 3	13	— 0, 21
Aug. 9	— 12, 0	7	— 0, 31
16	— 14, 2	28	— 0, 34
Sep. 13	— 24, 0	12	— 0, 80
25	— 35, 5	22	— 0, 84
Oct. 17	— 52, 1		

Although a thermometer was attached to the clock, I could not from a necessary attendance to business register it regularly; the difference of its height in March and June may be taken at about 22 degrees, and in July and October 14, without much error.

On comparing it with the rate of the clock, the compensation, in the latter case, appears nearly as much too great, as it was in the first too small. The true length of the zinc rod ought to be about 23 inches.

The length of the zinc rod, thus ascertained, is $1\frac{3}{4}$ inch more than the experiment by the lamp makes it; indeed, I have always suspected there might be some error in that experiment, on account of the length of the arc of vibration being affected by it.

Having no means of finding the time accurately but by equal attitudes, I could not get so many observations as might be wished. I trust, however, these will not be found altogether useless.

I am, Sir,

Your obedient Servant,

HENRY WARD.

Blandford, Oct. 21, 1806.

To C. Taylor, M. D. Sec.

TEN GUINEAS *were this Session voted to Mr.* MARTIN FURNISS, *No.* 128, *Strand, for a new Air-tight Door Hinge.*

The following Communication was received from him, and an explanatory Engraving is annexed.

A Model of the Invention is placed in the Society's Repository.

SIR,

THE model I have herewith sent is my invention. I beg leave to lay it before the Society for the encouragement of Arts, Manufactures, and Commerce, in the hope that they will be pleased to examine it, and find it worthy of some mark of their approbation. It is a model for putting together the joints of a folding screen, so as to fold in either direction without admitting the smallest quantity of air; it may likewise be appropriated to hanging of doors.

I am, Sir,

Your humble Servant,

M. FURNISS.

No. 128. *Strand, London, Oct.* 15, 1806.

To C. TAYLOR, M. D. SEC.

A Certificate from Messrs. WILSONS, cabinet-makers in the Strand, testified that Mr. M. Furniss's model for screens or doors, is his own entire invention, and has been executed by them on a high-folding screen for a lady in Baker-street, Portman-square.

Reference

Reference to the Engraving of Mr. Furniss's Air-tight Hinge for a Door or Screen.

Fig. 9. A plan of the joint: A B, two sides of the screens with circular ends, joined by a piece of leather reaching from top to bottom fastened at C, and wrapping (like the letter s) partly round the curve of one fold of the screen, and partly round the other to D, where it is also fastened: E F, a chain formed of brass plates rivetted together, winding round in a groove from off one fold of the screen on to the other, the contrary way to the leather, and thus mutually keep each other stretched tight, the chain winding on when the leather winds off, and vice versa; thus they move smoothly round one another. G Fig. 10, a piece of brass (left out in the last figure in order to shew the chain) screwed to the centre of each curve of the screens which forms the hinge, and by keeping the folds of the screen at their proper distance secures the easy action of the chains and leather, and prevents their being over-stretched. H H, a line of green twist fastened along the bottom of the screens, and passing through a staple on the joint at G, serving to keep the screen air-tight on the floor.

Fig. 11 is an elevation shewing the top and bottom joints, with the same letters of reference.

The

The GOLD MEDAL *of the Society was this Session voted to Mr.* F. C. DANIEL, *of Wapping, for his Apparatus to secure Persons from sinking in Water, or to act as a Life Preserver when Shipwrecked.*

The following Communication was received from him, and an explanatory Engraving is annexed.

One of the Machines is preserved in the Society's Repository for public Inspection.

SIR,

I HAVE taken the liberty of sending one of my Life-Preservers, and am proud to say, they have realized the name; and I shall feel myself obliged if you will cause it to be brought before the Society for their approbation. I beg to say, Sir, though I have given it publicity, it has never been before any committee.

I have inclosed a copy of a letter, which I received from the only surviving officer of the Alert private ship of war, and, independent of that document, I have had information from respectable authority, that the machines have saved several lives.

It is not, Sir, a pecuniary reward I look for, although I have sunk near 1500l. in the undertaking; yet, I must confess, to have the sanction of the Society of Arts would be highly flattering, and the world from that moment must be convinced of their utility.

I have the honour to be, Sir,

Your obedient Servant,

F. C. DANIEL.

Wapping, Oct. 22, 1806.

To C. TAYLOR, M. D. SEC.

Copy

Copy of a Letter from Mr. GEORGE WILLERS, *late Surgeon of the Alert, Private Ship of War, lost off the Western Islands.*

SIR,

I AM happy in having it in my power to say, I owe my life to your invaluable invention, the LIFE PRESERVER; and the circumstances relative thereto, are as follow :—I shipped as surgeon on board the Alert, private ship of war, mounting 18 guns, and 98 men, commanded by James Desormeaux, esq. belonging to Messrs. Wright and Birch, Walbrook. We sailed for Falmouth, April 1805, and, after cruising five months, on the 22d of September, we unfortunately struck on a rock in the Western Islands, and the ship went to pieces in five minutes ; at that time we had eighty-four men on board : I witnessed the loss of every officer, six in number, and sixty-four foremast men ; thirteen of the crew were saved, by clinging to pieces of the wreck, spars, &c. which drifted from the wreck ; and I have the happiness to say, by possessing one of your Life Preservers (though I cannot swim,) I was supported for some time, the sea running mountains high, but providentially a large Portuguese boat put off to my assistance, being then near a mile from the shore ; and I was thus saved by the hands of Providence, and your invention, from a watery grave.

I beg, Sir, you will permit me to acknowledge how much I feel myself obliged to you ; and you are at full liberty to make this case known for the benefit of mankind.

I am, Sir,
Your most obedient Servant,
G. H. WILLERS.

Kennington, Aug. 2, 1806

To F. C. DANIEL, Esq. Wapping,
Inventor of the Life Preserver when Shipwrecked.

SIR,

MR. George Willers, late surgeon of the Alert, private ship of war, and whom I succeeded as a surgeon in Mansion House-row, Kennington, in April 1807, went, as I have been informed, again to sea some time in the month of July or August following.

I have in my possession an engagement wrote by Mr. Willers, and which I have compared with the letter sent to Mr. Daniel, of Wapping, by him, giving an account of his happy escape from drowning, by means of his Life Preserver; and I have no hesitation in saying, that the letter is in Mr. Willer's hand-writing, so far as comparison will guide me, having seen him *write* and *sign* the engagement above mentioned.

I have the honour to be, &c. &c.

HUGH BROWN.

Mansion House-row, Kennington, March 7, 1808.

To C. TAYLOR, M. D. SEC.

Copy of a Letter from JOHN DICKENSON, *Esq. of the City of Norwich, to Mr.* DANIEL.

SIR,

I INTENDED myself the pleasure of calling on you, and acquainting you personally of a singular incident, when the

the excellence of your machine, or Life Preserver, was most conspicuously manifested.

I went from the city of Norwich, in a pleasure-boat that I keep for the amusement of sailing, in company with a gentleman and two ladies. As our return to Norwich, in the evening, was indispensible, and the direction of the wind favouring us both ways, a few hours would effect it, the distance being only thirty miles: accordingly we set sail about four o'clock, it being moon-light during the night; and fortunately procured, in case of accident (the wind blowing hard at south-east) one of your Life Preservers, through the interest of a friend, of a captain, who had purchased one at Newcastle. The precaution proved, in a short time after sailing, to have been a fortunate one indeed. On tacking to enter Norwich river, at the extremity of a broad water, two miles over, known by the name of Braydon, a sudden gust overset the boat, precipitating myself, companion, and two ladies, into as agitated a water as I have ever seen at sea, (except in hard blowing weather). You may judge my situation at such a juncture. Your machine was jokingly filled as we came along, to which I ascribe (though very unexpected by us) our preservation. The gentleman, whose name is Goring, was inexpert at swimming, and with difficulty kept himself up, till I reached him; and then directing him to lay hold of the collar of my coat, over which the machine was fixed, I proceeded towards the ladies, whose clothes kept them buoyant, but in a state of fainting when I reached them: then taking one of the ladies under each arm, with Mr. Goring hanging from the collar of the coat, the violence of the wind drifted us on shore upon Burgh Marshes, where the boat had already been thrown, with what belonged to her. We got the assist-

anceof some country men directly, (after taking refreshment at a marsh farmer's house, where we procured some dry clothing for the ladies, who were now pretty well recovered,) and by their endeavours put the boat in sailing trim, and prosecuted our voyage to Norwich, which we effected by eleven o'clock that night.

From this singular escape, on my return from Birmingham, I shall be induced to inspect your warehouse, and procure the various prices of your invention, anxious to recommend it in even sailing excursions, in which its utility has been so evidently demonstrated, and its use ascertained.

You are at liberty, Sir, to make whatever use you please of this account, and I beg to subscribe myself,

Sir,

Your most obedient humble Servant,

JOHN DICKENSON.

Swan with Two-Necks, Lad-lane,
Jan. 30, 1807.

SIR,

I HAVE lately received a letter from my friend, Mr. A. French, making enquiry respecting an accident which happened some time since, at the extremity of an extensive piece of water, (called Braydon, near this town) of a pleasure-boat being upset, in which were two ladies and two gentlemen, who were providentially saved by one of Daniel's

Life

Life Preserver's, from the turbulence of an open water, which, when the wind is high, is very violent, and resembles a rough sea. I beg leave, therefore, to acquaint you, Sir, for the information of the Society of Arts, &c. that the above circumstance is within the recollection of myself and many other persons in this place, and also of Norwich, to which city the boat was destined. I feel myself happy in giving this testimony of the excellence of the Life Preserver; and for humanity's sake, I sincerely hope its publicity will be promoted as much as possible, and patronized by every enlightened individual.

I am, Sir,

Your obedient Servant,

W. BARTH.

Great Yarmouth, March 7, 1808.

To C. Taylor, M. D. Sec.

Reference to Mr. Daniel's Machine, called a Life Preserver when Shipwrecked, Pl. 10. *Fig.* 1.

A, represents the body of the machine, which is double throughout, made of pliable water-proof leather, large enough to admit its encircling the body of the wearer, whose head is to pass betwixt the two fixed straps, B B, which rest upon the shoulders; the arms of the wearer pass through the spaces on the outside of the straps; one on each side, admitting the machine under them to encircle the body like a large hollow belt; the strap, C, on the lower part of the machine, is attached to the back of it, and

by passing betwixt the thighs of the wearer, and buckling at D, holds the machine sufficiently firm to the body, without too much pressure under the arms. The machine being thus fixed, is inflated with air by the wearer blowing in from his lungs through the cock, E, a sufficient quantity of air to fill the machine, which air is retained by turning the stop-cock. The machine, when filled with air, will displace a sufficient quantity of water to prevent four persons from sinking under water.

Mr. Daniel recommends his Life Preservers to be prepared as follows: viz. To select sound German horse-hides, and to cut a piece six feet long, and two feet six inches wide, free from blemish or shell; it is first to be curried, and then rendered water-proof by Mollersteins patent varnish, of Osborn-street, Whitechapel, which preserves the leather more supple, and admits it to be easier inflated than any other water-proof leather.

The leather is nailed on a board, and the varnish applied upon it; it is then to be passed into an oven several times, the varnish being each time repeated, till the leather is completely covered; it is then cut in the form of a jacket, as above described, and neatly and firmly stitched; the seams and stitches are afterwards to be perfectly secured by the following black elastic varnish.

℞.—Gum asphaltum, two pounds; amber, half a pound; gum benzoin, six ounces; linseed-oil, two pounds; spirits of turpentine, eight pounds; and lamp-black, half a pound; united together in an earthern vessel with a gentle heat. The machine, when properly made according to the drawing and description, resembles a broad belt, or circular girdle, composed of two folds of pliable leather attached together, and perfectly impervious to water. When used, the

wearer

wearer introduces his head and arms within the circle, the stop-cock in front, the two fixed straps, E E, rest one upon each shoulder, to prevent the belt from sinking down; the lower strap, C, is then brought between the thighs, and buckled in front, which prevents the machine from being forced back; the machine is then inflated by the application of the mouth to the stop-cock in front, and when properly filled, the turning of the cock retains the air in the machine, and expands it so much as to displace a quantity of water so great, as to sustain the wearer, and a further weight, if necessary, buoyant in the water.

A Publicity having been recently given to some Experiments off the Eastern Coasts of this Island, for preserving Lives in Cases of Shipwreck, by Means of a Rope attached to a Shell thrown from a Mortar; the Society think it incumbent on them to remind the Public, that so far back as the year 1792, *a Bounty of Fifty Guineas was given to Mr.* JOHN BELL, *then Serjeant, afterwards Lieutenant of the Royal Regiment of Artillery, for his Invention of throwing a Rope on Shore, by means of a Shell from a Mortar, on board the Vessel in distress; the particulars of which were published in the tenth volume of the Society's Transactions, page* 204; *but a descriptive Engraving having been omitted at that time, it is thought expedient to insert it in the pre-*

sent Publication, with some further Particulars then omitted.

Models and Drawings of the whole Apparatus are reserved in the Society's Repository, for the Inspection of the Public.

THE several trials made before a Committee of the Society at Woolwich, on the 29th of August 1791, of throwing a line on shore on this principle, were as follow.

From a boat moored about 250 yards from shore, the shell was thrown 150 yards on shore, with the rope attached to it; the shell was of cast-iron, filled with lead, it weighed 75 pounds, its diameter eight inches; the rope in the trial was a deep sea-line, of which 160 yards weighed 18 lbs. the angle of the mortar from whence the shell was fired, was 45 degrees. By means of the line, Mr. Bell and another man worked themselves on shore upon his raft of casks; there were many kinks in the rope, which were with ease cleared by Mr. Bell, in which he was much assisted by his snatch blocks.

The second trial was repeated in a similar manner, and with equal success, the shell falling within a few yards of the former place, the gale of wind was brisk, and the water rough. The direction of the shell was nearly from north to south, and the wind blew nearly north-west.

In the third trial, the mortar was elevated to 70 degrees; the rope attached to the shell, was an inch and half tarred rope, of which every 50 yards weighed fourteen pounds and a half; the shell of the kind above-mentioned, it fell 160 yards from the mortar, and buried itself about two thirds in the ground; the line or rope ran out was about 200 yards, and it required

quired the force of three men to draw the shell out of the ground at that distance.

The grommet, in all these trials, was of white three inch rope; and in all the above trials, by means of the line, two men worked themselves on shore upon the raft: each charge of powder was fifteen ounces.

A fourth experiment was made by firing, from the same mortar, a grapnel in a wooden case; it did not retain its hold in the ground so well as the shell, but amongst the crevices of rocks, or where the vessel is near shore, will be useful.

A grapnel of this kind may be fired from a common cannon with an endless rope, running in a pulley or small block fixed thereto, by which a raft may be successively drawn to and from the vessel either by the persons on board the vessel, or those on shore.

Observations made by Lieutenant Bell, upon throwing a Line on Shore in Case of a Ship being stranded.

1st, From the proposed construction of the piece of ordnance, intended to throw the shot and line on shore, I suppose it will be between five and six hundred weight.

The chamber is to contain one pound of powder, and the bore to admit a leaden ball of sixty pounds or upwards; the length of range, or distance, will depend upon the size of the line made use of; I suppose it will carry a deep sea-line between three and four hundred yards distance.

2d. All ships that have iron ballast, may use this piece

as

as a part of it, and then there would be only the trifling difference of casting so much of the ballast into the form of the piece; the leaden balls may likewise be used as ballast.

3d. I am of opinion there are various ways, on board of a ship, that the mortar may be placed in a proper position for firing without a carriage expressly made for it; it may be placed upon a coil of rope, or its trunnions rested upon coins, or any thing else, whereby the muzzle can be raised so high that the groove upon the trunnion appears vertical, as the piece in that position would be elevated nearly 45 degrees.

4th. As I imagine all ships carry deep sea-lines, on that account I made use of it in the experiments at Woolwich, but if it should be thought too short for the distance, any other light line may be added to the length of it.

5th. Supposing a ship's owner to purchase such a piece of ordnance with the leaden balls, and a block carriage; I do not think the whole would amount to more than ten or eleven pounds expence.

6th. Where a ship is driving or unmanageable near the shore, it would be proper to have the piece loaded, the line reeled upon hand-spikes or poles, and laid upon the deck ready for firing at any time it might be judged necessary. The hand-spikes or poles, the line is reeled upon, preserve it in an horizontal form; and they are not to be drawn out until the instant of firing: in this manner the line will deliver itself freely.

The five water-casks should also be prepared in readiness, by lashing them together, and a seaman's chest fixed upon the top of them, having part of its ends or sides cut out in order to let out such water as may be thrown into it by the surf. I dare undertake to land with such a float upon

a lee

a lee shore any where upon the coast, when it might be deemed unsafe for a boat to make good its landing.

7th. There is every reason to conclude, that this contrivance would be very useful at all ports of difficult access both at home and abroad, where ships are liable to strike ground before they enter the harbour, as Shields Bar, and other similar situations, when a line might be thrown over the ship, which might probably be the means of saving both lives and property; and moreover, if a ship, was driven on shore near such a place, the apparatus might easily be removed to afford assistance; and the whole performance is so exceedingly simple, that any person once seeing it done, would not want any further instructions.

JOHN BELL.

Woolwich, Aug. 29, 1791.

Some further Observations made by Lieutenant Bell, upon the Application of the Mortars intended for throwing a Line on Shore, in Case of a Ship being stranded.

1st. In trading ships, this piece would answer for making signals of distress, by filling the chamber with powder, and well wadding it, as the report would be heard some miles distance at sea.

2d. Such a gun, being accompanied with a few rounds of round and grape-shot, would defend a ship much better than

than a longer gun, against any piratical or other hostile intentions, as, from its shortness, it would be more readily loaded and fired with a larger charge each time.

3rd. Accidents from a gun bursting, which may arise from an unskilful person loading with too great a proportion of powder, is in this piece effectually guarded against, by the chamber being constructed to contain but one pound of powder, a quantity which is only about one-third of the usual charge of a cannon.

4th. From the small size of such a gun and carriage, it might be kept upon deck, without much inconvenience in working the ship, in order to be ready if necessity required; and when the ship is out at sea, it might then be put below. But from the number of dreadful wrecks, which so frequently happen along the coast, it certainly would be prudent to have it always upon deck when within sight of land, and particularly in stormy weather.

JOHN BELL.

Woolwich, Sept. 30, 1791.

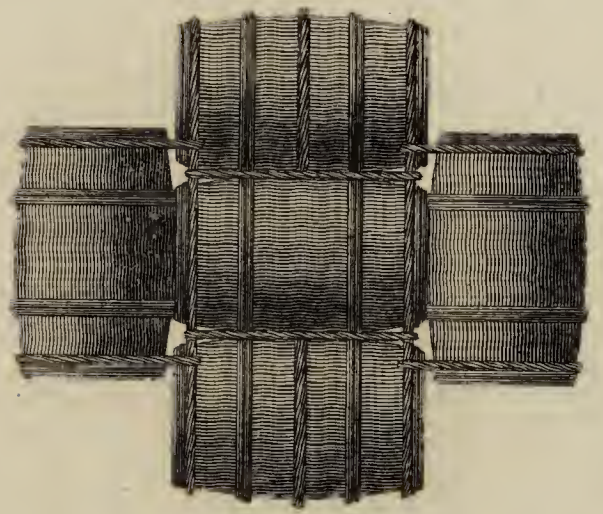
To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Lieutenant Bell's Method of throwing a Rope on Shore, from a stranded Vessel, Pl. 10. *Fig.* 2.

a, Represents the mortar on its carriage; *b*, the shell shown within the mortar by dotted lines; *c*, the grommet, or double rope, which connects the shell and line; *d d*, the line

Mr. Daniels' Life-preserver from Shipwreck.

Fig: 6.



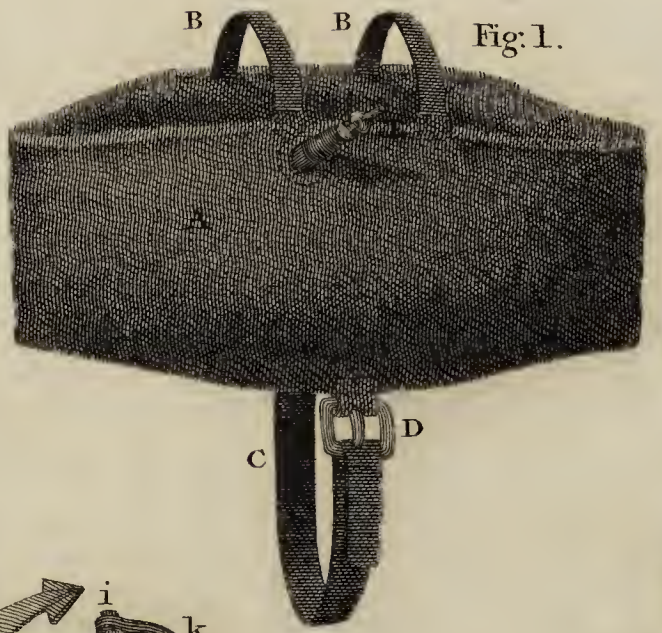
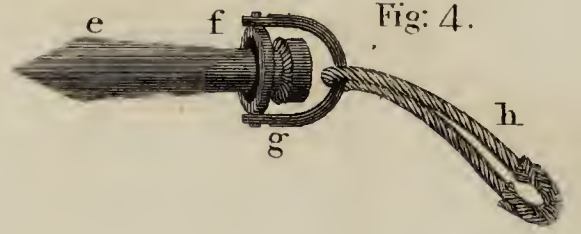


Fig: 1.



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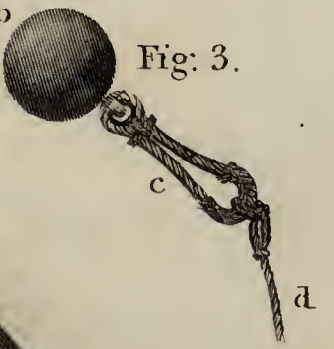


Fig: 3.

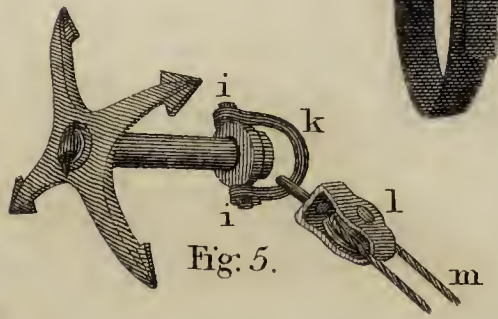


Fig: 5.

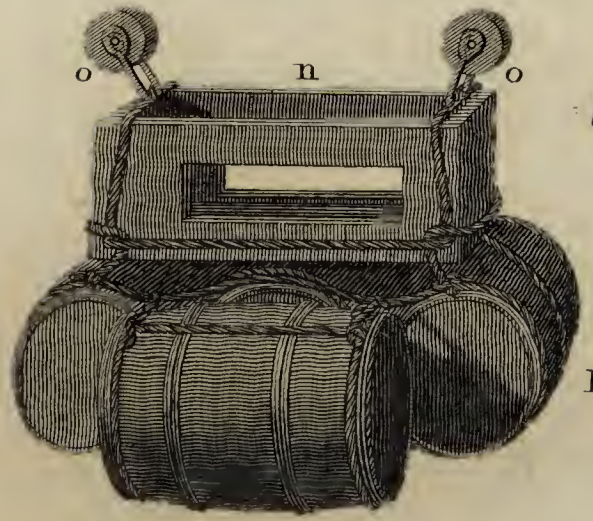


Fig: 7.

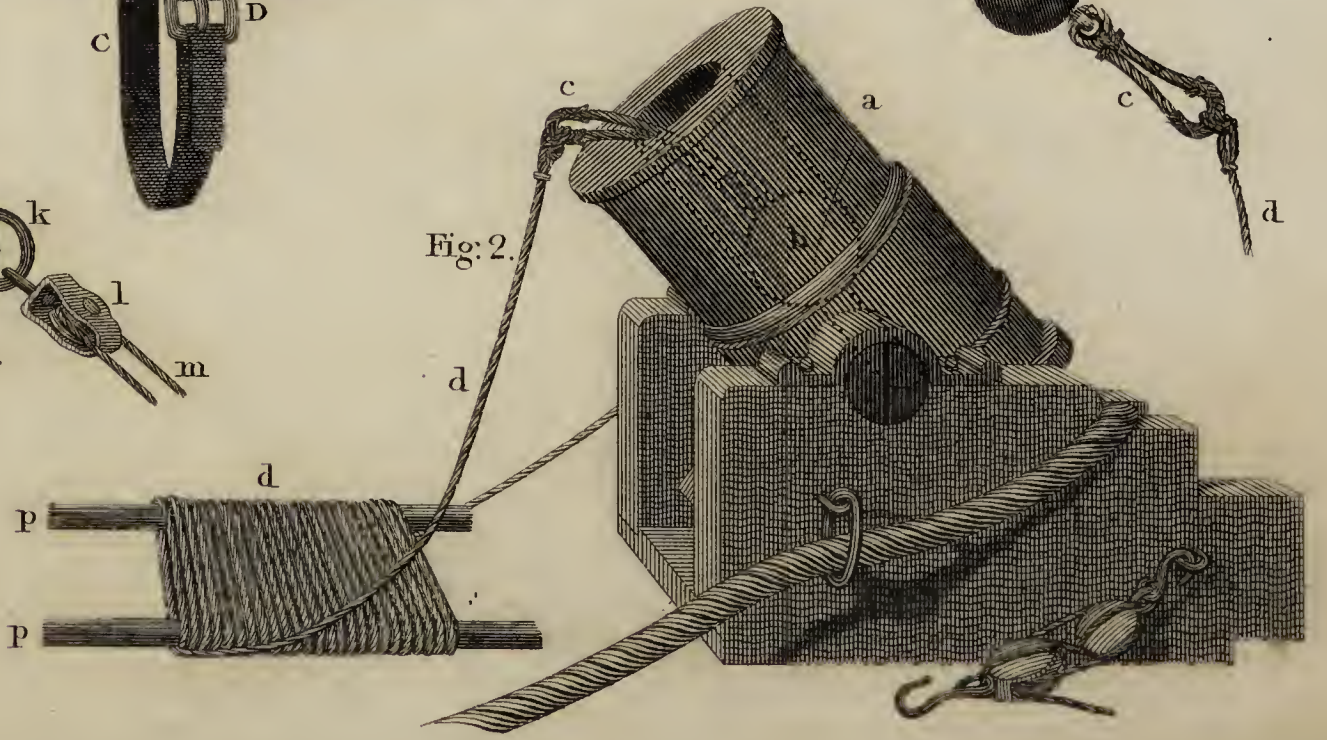


Fig: 2.

Lieut.t Bell's Method of saving persons from stranded Ships.

Varley del.

S. Porter sculp.

line to be thrown on shore, now ready wound on the poles or hand-spikes, *p p*, and which are to be withdrawn when the mortar is fired.

Fig. 3. Is a separate view of the shell, with the grommet and end of the line attached thereto, explained by the same letters.

Fig. 4. Shows another invention, suggested instead of a shell, and to be fired from a common cannon, in which *e*, is an iron pin; *f*, an iron collar and rope sliding upon it; *g*, an iron ring which turns upon two pins in the collar; *h*, is the grommet or double rope, attached to the ring, to which the line to be thrown on shore is fastened. This plan may be used where people are on shore, to assist when a line is thrown.

Fig. 5. Shows a grapnel which may also be fired from a common cannon; the collar slides along it in the same manner as that in fig. 4, to allow the head of the pin to go down to the wadding within the cannon; *i i*, are two pins on which the ring *k*, is moveable; *l*, the block or pulley fastened to the ring; *m*, the endless or double line running through it.

This method may be used with great advantage, where a ship is stranded near the shore; but where a mortar is on board, the use of the shell and line is the most certain.

Fig. 6. Shows the method of forming a raft, by lashing together with ropes five empty water-casks belonging to the ship.

Fig. 7. Represents the raft ready for use; the apparatus *n* to hold the person upon it, is made from a seaman's chest with holes cut in the sides of it, to allow the person within it firmer hold, and to let out the water that may be thrown into it from the waves; *o o* are two pulleys attached to the ends of the chest,

chest, and through which the line is to run; the raft is to be ballasted underneath, to prevent it from upsetting.

The whole apparatus is so arranged as to be inclosed in a small box, as may be seen by a reference to that in the Society's possession.

PAPERS

IN

COLONIES AND TRADE.

The Sum of TWENTY GUINEAS *was voted in December* 1807, *to Mr.* EZEKIEL CLEALL, *of West Coker, near Yeovil, in Somersetshire, for his Machine for beating out Hemp-seeds and Flax-seeds, likely to be useful in Canada.*

The following Communication was received from him, an explanatory Engraving is annexed, and a Model of this Invention is placed in the Society's Repository.

SIR,

I MADE a model of a machine for thrashing out hemp-seed and flax-seed, in the year 1803; and in the year 1805, I had a real machine made after the plan of the model, by Mr. John Wadman, carpenter and hemp-merchant. The said machine has been since tried and approved by many hemp and flax-merchants.

I now send the model for the inspection of the Society, and leave the event thereof to their decision. It does not injure the stalk of the hemp so much as the common mode of thrashing out the seed, and consequently leaves it much better for scaling.

I am, Sir, your humble Servant,

EZEKIEL CLEALL.

West Coker, near Yeovil, Somerset.
March 22, 1806.

SIR,

In compliance with your request, I have sent certificates of the success of my machine in practice for thrashing out hemp-seed and flax-seed, which being signed by people of respectability who have used it, I hope will prove satisfactory.

I am, Sir,

Your humble Servant,

EZEKIEL CLEALL.

We whose names are hereunto subscribed, do certify, that we well know Mr. Ezekiel Cleall, of West Coker; that we have many times seen his machine at work, in thrashing out hemp-seed and flax-seed, and think it likely to be of great public utility; inasmuch as two women, whose wages and allowance never exceeds one half of what are allowed to two men, will do as much work in any given time as such two men.

That the seeds thrashed by this machine are not so much bruised or injured as by the old or common way, and the hemp and flax are preserved from many injuries which they suffer from the old method.

In witness whereof, we have hereunto added our signatures.

John Wadman.
James Wadman.
John Baker.
John Pinney.
John Chaffey.

West Coker, Feb. 1807.

To C. Taylor, M. D. Sec.

SIR,

SIR,

THE machine, of which a model was sent to the Society some months ago, must be used with eight flails, two on each arm, for beating out hemp-seed.

When required to be used for beating out flax-seed, the above eight flails must be taken out, and four beaters put in their place.

The height of the machine from the floor to the top of the board on which the flax or hemp is laid, is two feet; the breadth, two feet ten inches; the length of the board, four feet four inches; the length of each of the arms, from the axis of the machine, is three feet two inches; the flails for the hemp-seed, two feet two inches long; the heights of the uprights, seven feet two inches; the beaters for the flax-seeds, are each one foot three inches long, and seven inches broad.

The machine will thrash, in one day, as much hemp as grows on an acre of land, and other crops in proportion; and the work is done with less than half the expence of thrashing in the usual way.

I am, Sir,

Your obedient Servant,

EZEKIEL CLEALL.

West Coker, Aug. 13. 1807.

To C. TAYLOR, M. D. SEC.

Reference to the Engraving of Mr. Cleall's Machine for beating out Hemp-seeds and Flax-seeds. Pl. 11. *Fig.* 1, 2.

Fig. 1. Represents the machine for beating out hemp-seeds, in which A is the table or board on which the hemp is to be

placed; B the axis in which the four arms, C C C C, are fixed; D D D D D, eight single flails, moving upon four pins near the extremities of the four arms; these flails diverge from the pins on which they move, so that two of them united on each arm are nearly in the form of the letter V. E is the winch or handle by which the machine is put in motion; F F, two upright pieces of wood to sustain the axle of the machine; G, an upper cross-piece, to secure the uprights firm; H H, the two bottom pieces or sills, in which the two uprights are mortised, also the two smaller uprights which support the board or table A; I I, two lower cross-pieces to secure the machine firmly; K K, two levers on which the table A rests, and by which it may be raised or lowered as thought necessary by iron pins, at K K, passing through these levers and the two uprights.

When the machine is used, the hemp must be laid on the table A, and moved about in different directions by the person who holds it, whilst another person turns the machine by the handle E; the flails D of the machine fall in succession on the hemp; as the axis moves round they beat out the seeds as different surfaces of the hemp are exposed on the table, and when the seeds are all beaten out from one parcel of hemp, a fresh quantity is applied upon the table.

Fig. 2. Represents one of the flax-beaters, which is made of a solid piece of wood, one of which is attached instead of the two flails, to every arm, when the machine is employed for beating out flax seeds, as they require more force to separate them from the flax plant.

The SILVER MEDAL *of the Society was this Session voted to* WILLIAM BOND, *Esq. of Canada, for his Observations on the Culture of Hemp, and other useful Informations, relative to Improvements in Canada.*

The following Communication was received from him, and an explanatory Engraving of his Machine for breaking Hemp is hereunto annexed, and a Model of the Machine is preserved in the Society's Repository.

Observations on the Culture of Hemp, the Breeding of Rabbits, Guanaco, &c.

HEMP.

THE culture of hemp in Upper Canada is no doubt one of the most desirable objects with every person of discernment settled there, and more particularly so with those of this description in our mother country; and though there are so many millions of acres so well calculated to the growth of this highly valuable article, yet I do not expect much progress therein for some time, for the following reasons.

The part of the country the best calculated for the growth of hemp is so lately and in so small a degree occupied, that few have begun to use the plough, but depend upon raising a sufficiency of grain by harrowing only; in this they are not disappointed for two or three crops;—in the mean time they clear away fresh fields from the woods, many of them to a large extent, which take up so much time in fencing and dressing, that few of the farmers have been able to raise more than needful for their own families' consumption, and for the use of their neigh-

bours; indeed they are ignorant as to the growth and management of hemp, and in general so poor, that they cannot afford to raise any thing for sale that will not bring them ready money as soon as brought to market; and grain brings such a high price in cash, that few farmers are inclined to turn their attention to any other article. Another obstacle is, there being no person or persons appointed to buy small quantities of hemp, and pay ready money for the same.

The tract of rich hemp land in Upper Canada is that part west of Yonge Street, * and north of Dundas Street, † and partly inclosed by lakes Ontario, St. Clair, Huron and Simcoe, and to the east and north east almost as far as Grand or Ottaway River, and to within a few miles of the south and south east side of Lake Huron. I have not failed to make annually from one to three journeys through this tract; I have crossed it in all directions with Indian guides, great part of which no white man, except myself, has ever set foot in; and I find, that chief of the interior part consists of a rich deep black soil, which I am well convinced, when well inhabited with farmers, will become one of the finest countries in all his Majesty's territories for the growth of hemp.

It is only about five years since this valuable tract began to be occupied at all, and though by industrious farmers, yet by such as have brought little to the country. A few cows and sheep, a *pair* of plough-oxen, one or two horses, a small stock of farming tools, such as two or three axes, as many hoes and iron wedges, one or two ox-chains,

* A street leading from York, the seat of government, to the navigable waters of Lake Simcoe.

† Leading to the River Thames.

being

being the most that a new settler (generally speaking) possesses on his arrival; with these they make a shift to clear away the woods, and divide and fence the land with split timber into fields, and they are greatly encouraged to continue clearing away the forest, in consequence of the high price given for the ashes by the pot-ash makers: this eventually will be vastly in their favour, in future, when hemp becomes the object, as it gives time for the roots and stumps of trees to rot, their stock of horses and oxen to increase, which is essentially necessary before the farmer can expect to be successful in the growth of hemp. It is in this progressive manner that this fine country will be settled; the nature of things demands the pursuit; and the first settlers are in a situation capable of putting the same in practice; their stock of horses and oxen are sufficiently strong to work the ground a second time over, tear up the stumps and roots, plough and pulverize the soil; and until the ground is brought to this state, it is not fit for hemp, as hemp, in its nature, depends chiefly upon a tap root, and when this root is interrupted in its progress downwards, it will throw out horizontal ones, which produce horizontal branches also, and the open spaces round the stumps of the trees admitting so much air, permits these branches to grow to such a length and strength as greatly to injure the bark or hemp of the stem. Such hemp, when it comes to the hackle, breaks off, and drags away at the knobs of the branches, so as to leave it short, and make a very great waste; notwithstanding, if there was a sure market for as small a quantity as 50lb. there are few farmers but would try the experiment; and if one was more successful than the rest, his neighbour would endeavour to find out the reasons why it was so; thus, step by step, the knowledge in the manage-

ment of hemp would be greatly extended, the farmer would generally be in possession of fresh seed, and when grain becomes less an object, he would feel no fear in turning his attention to the culture of hemp upon a large scale; and, in order to encourage the farmer, it would prove highly advantageous to take in any quantity, great or small, of sound hemp, assorted perhaps into four or five qualities, according to its length, which will vary for some years to come, for the reasons before given.

The high price of labour, owing in some measure to the high price of grain, is such, that hemp, agreeable to the present regulations, is not an object with the farmer; if an addition of about a third of the present price was given, it would be an inducement for the farmers to cultivate their old fields in a more spirited manner, which bounty might be taken off again, when grain becomes less an object than it is at present, which will soon be the case in time of peace, and no doubt will affect the price of hemp in proportion in the English market.

In all new countries where labourers are scarce, we find many contrivances calculated for the purpose of reducing labour, more for the sake of expedition than ease; such, for instance, as the saw-mill, the hoe-ploughs, scythe and cradle for cutting and gathering grain, the wooden machine drawn (round by one horse) for thrashing grain, the iron shod shovel, drawn by oxen, and held by two handles, as a plough, for the purpose of levelling the the roads, &c. &c. Nor are the Americans, or other settlers &c. in this country, fond of any work that needs violent exercise of the body, which the breaking of hemp in the old way certainly occasions, in consequence of requiring a cross motion of each arm, which makes the breakers complain of a pain about the short ribs on the side they hold the hemp; and

and on the opposite side a little under the shoulders, so that breaking of hemp in the old way is a great obstacle to its increased culture. To render labour, therefore, somewhat more easy and expeditious, is an object worthy the first attention, and I consider it practicable at a small expence, and have sent to the Society a model of a machine for this purpose.

I have observed among the clothiers' and fullers' machinery, great power and rapid motion proceeding from what is commonly called a dash wheel, erected across a stream of rapid water, the flies or float boards of which are fixed in the octangular axis, from fifteen to twenty-five feet in length, and from three and a half in depth, each flie. I have seen many corn mills in Upper Canada, with no other water-wheels than such as the above described, which save a vast expence in raising dams, &c.

There are a number of streams in that part of Canada, which I have endeavoured to describe, (as to the practicability of the various ways of cultivation) that are well calculated for such wheels; and where these streams or rivers are not too wide, the axis of the wheel might be extended across so as to reach the land on each side, where I prepare the breakers to be fixed to go by a tilt the same as a forge-hammer, and such a simple piece of machinery would not cost more than 70 or 80 dollars, as little iron would be wanted, and timber we have for nothing; and when in motion would employ four breakers and two servers, from whom I should expect as much good work as fifteen or sixteen persons could possibly do in the old way, and that without much bodily labour.

Mills for breaking hemp, on the very same principle as that of a saw-mill, as to motion only an addition of an iron

crank, so as to run with two cranks instead of one, with something of a larger sweep than that of a saw-mill, would be of vast utility in a neighbourhood of a large growth of hemp, and would not cost more than a common saw-mill, as the brakes of the frame continue in motion the same as that of a saw-mill, twenty men might be employed, who would do as much as fifty or sixty could do in the old way, and with much more ease and pleasure to themselves; and this is not the only advantage that would result from such mills; it would cause something of a social meeting, which the youth would be particularly fond of. At such meetings all the defects respecting the culture and management of hemp would be examined into, and those who raised the best would become ambitious, and try to excel each other; thus we might reasonably expect that Upper Canada would far exceed all other countries in the world for the growth of good hemp.

Reference to the Engraving of Mr. Bond's Machine for breaking Hemp. Pl. 11, *Fig.* 3, 4.

Fig. 3. *a.* Represents the axis of a water-wheel, on which is fixed a trunnion of four lifters *b b b b*, each of which lifters raise in succession a lever *c*, which, by means of a chain connected with it pulls down another lever *d*, and thereby raises the upper part of the double brake *e*; as each lifter of the trunnion passes the lever *c*, it allows the upper part of the brake to fall upon the hemp placed on the lower part of the brake *f f*, and by its weight and teeth intersecting the teeth of the lower brake *f f*, the woody parts of the hemp plant are separated by repeated strokes from the filaments

or

or fibres of the hemp proper for use, and completes the first operation necessary in the preparation of hemp; *g* is a table on which the woody parts of the hemp fall, and which table gives security and strength to the frame; *h h h h* are the four legs or supports of the frame.

Fig. 4. Shews a section of the teeth of one half of the double brake abovementioned: it is betwixt the upper and lower rows of these teeth that the breaking of the hemp takes place, by the repeated rise and fall of the upper part of the brake upon it.

Fig. 5. Shews the upper part of the brake, in which *i i* shew the two rows of teeth, *k k* the two pins on which it is moved, *l l* the part to which the chain which raises the upper part of the brake is attached. After the breaking of the hemp, it is wholly finished for use by scutching or swingling, an operation which may be either performed by the hand or machinery, and is easily executed by either mode.

The machinery for breaking hemp should be removed from the rivers previous to the beginning of the frosts.

THE WARREN RABBIT.

To include the interest of the colonists and the mother country also in one and the same pursuit, is not only laudable, but most likely to succeed, especially where only a trifle of property of the individuals or of the public is wanted to set the bountiful hand of Nature to work in a country where animal subsistence, and a suitable climate calls for the industrious husbandman, who may in various ways be useful to himself and his country.

In

In my travels through America, I have often been surprised that no attempt has been made to introduce, for the purpose of propagation, that useful little animal, the warren rabbit, of such vast importance to the hat manufactory of England. It is chiefly owing to the fur of this animal that the English hats are so much esteemed abroad. It is a fact well known amongst the hatters, that a hat composed of one half of coney wool, one sixth old coat beaver, one sixth pelt beaver, and one sixth Vigonia wool, will wear far preferable to one made of all beaver, as it will keep its shape better, feel more firm, and wear bright and black much longer.

The value of the coney wool, the produce of the united kingdom only, is not less, I will venture to say, than 250,000*l.* per annum; but the quantity is much diminished, owing to the banishment and persecution they meet with on every side, and so many small warrens taken in for grain land; in consequence of which it is time, that some protection should be afforded, if possible, to that important branch of British manufactory (in which coney wool is used) from suffering any inconvenience in the want of so essential an article, and the accomplishment of this grand object I conceive perfectly easy.

General Observations.—When I speak of the warren rabbit, I have to observe, that there are in England, as well as in most parts of Europe, three other kinds, viz. the tame rabbit, of various colours, the fur of which is of little value, except the white; the shock rabbit, which has a long shaggy fur of little value; the bush rabbit, like those of America, which commonly sits as a hare, and the fur of each is of a rotten inferior quality.

To return to the warren rabbit.—There are two sorts in respect

Mr. Ocall's Machine for thrashing Hemp.

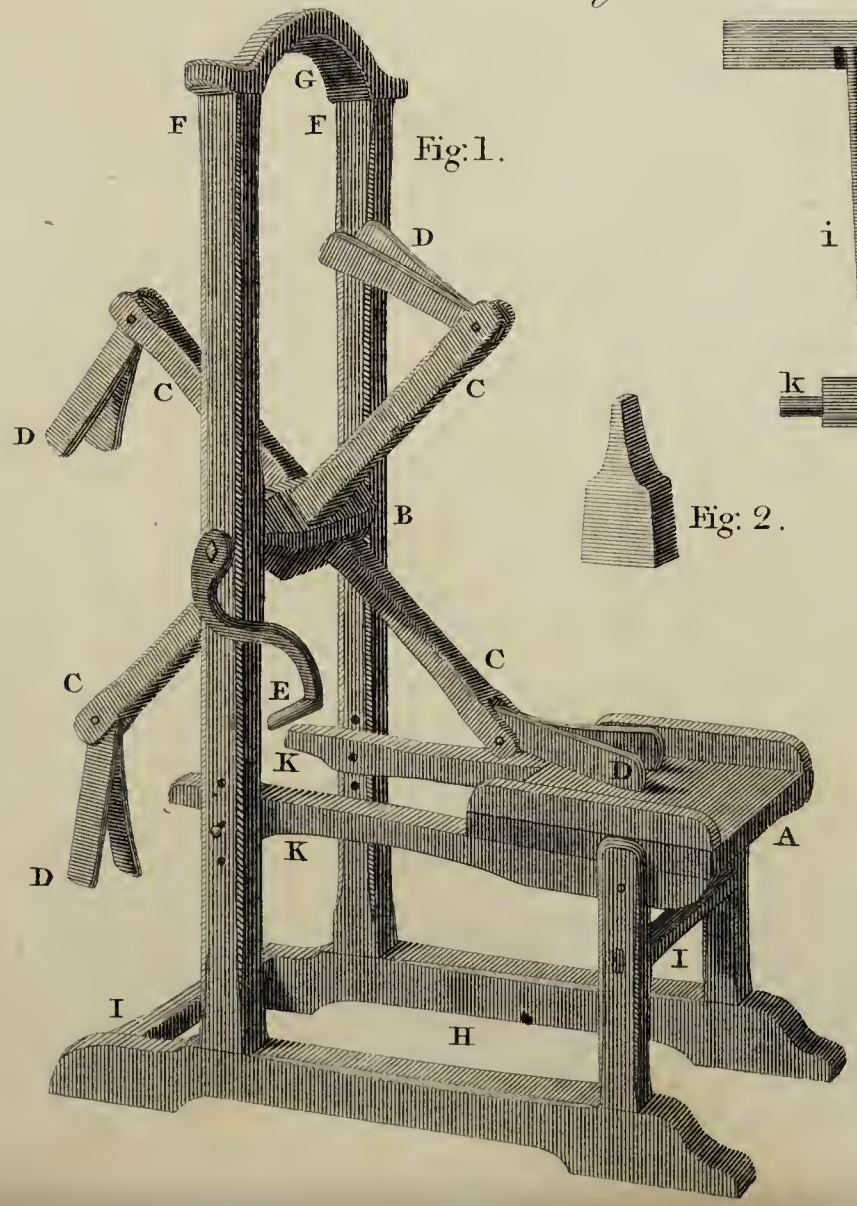


Fig: 1.

Fig: 2.

Mr. Bond's Machine for breaking Hemp.

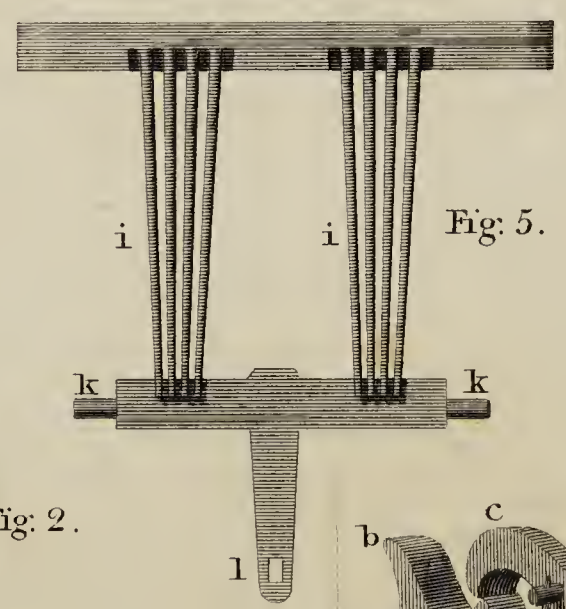
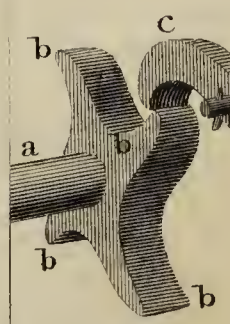


Fig: 5.



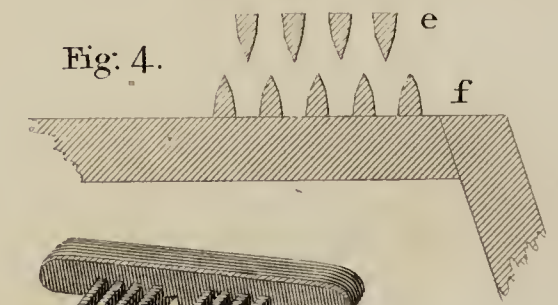


Fig: 4.

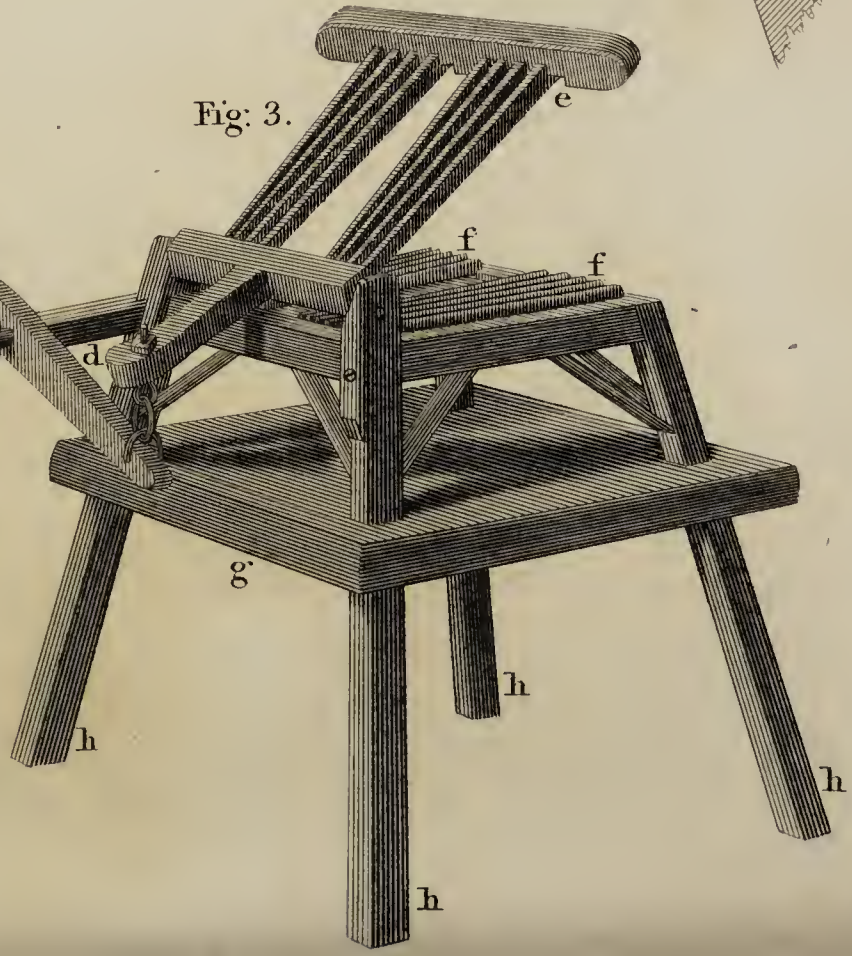


Fig: 3.

respect to colour, that is, the common grey, and the silver grey, but little or no difference in respect to the strength and felting qualities of the fur. The nature of this animal is to burrow deep in sandy ground, and there live in families, nor will they suffer one from a neighbouring family to come amongst them without a severe contest, in which the intruders are generally glad to retire with the loss of part of their coats, unless when pursued by an enemy, when they find protection.

It is scarcely worth while for me to mention a thing so generally known, viz. that rabbits, particularly those of the warren, are the most prolific of all other four-footed animals in the world, nor do I apprehend any difficulty would attend the exporting this little quadruped with safety to any distance, provided it was kept dry, and regularly supplied with clean, sweet food, and a due regard to the cleanliness of the boxes or places of confinement.

Twelve or fifteen pair of these valuable animals taken to Upper Canada, and there inclosed within a small space of ground suitable to their nature, but furnished with a few artificial burrows at the first, by way of a nursery, spread over those now useless plains, islands, and peninsulas, so well calculated to their nature, would, I will make bold to say, the eighth year after their introduction, furnish the British market with a valuable raw material, amounting to a large sum, increasing every year with astonishing rapidity, so as to become, in a few years, one amongst the first of national objects.

It may be supposed by some, that the above project is magnified beyond possibility, or even probability, but from the serious attention I have paid to the subject, these many years past, as to all points for and against, leaves no room

to

to accuse myself of being too sanguine, for if properly managed a few years at the first, I cannot find a single thing likely to interrupt their progress.

Some idea of the astonishing increase of the rabbit may be had from the following facts :—

An old doe rabbit will bring forth young nine times in one year, and from 4 to 10 each time; but to allow for casualties, state the number at 5 each litter.

In nine months	45
The females of the first litter will bring forth five times the proportion, of which is 2½ female's produce	62
Those of the second litter 4 times produce . .	50
Ditto of ditto third ditto 3 ditto ditto . . .	37
Ditto of ditto second ditto 2 ditto ditto . . .	25
Total in one year from one pair	219

The third female race of the old dam and the second of the first litter, seldom breed the first year, but are early breeders in the spring following, when we might expect an increase of the whole in proportion to the first pair, if properly attended to and protected.

It is generally allowed, that hares are not more than one fourth as prolific as rabbits, notwitstanding, agreeable to an experiment tried by Lord Ribblesdale, who inclosed a pair of hares for one year, the offspring was (as I have been credibly informed) 68 : these animals, could they be exported to Upper Canada with safety, and there protected within inclosures for a few years, would soon after spread over a large extent of country : the fur is nearly as valuable as that of the rabbit.

In

In that part of Upper Canada within the 45 degrees of north latitude, and the southern and western boundaries, the climate is nearly the same as that of England, a little hotter a few days in summer, and a little colder a few days in winter, agreeable to Farenheit's thermometer, which I have paid great attention to for some years, comparing the same with the observations of the English.

The increase of most animals appears much greater in proportion in America than in England, mankind not excepted: that of sheep is very apparent to those that pay attention to their breeding stock, which gives me hopes, that in a few years we shall be able to pay for our woollen cloths in wool. Finding the effect of soil and climate so salutary to sheep, &c. it may be reasonably supposed, that rabbits will answer the most sanguine expectations, as I understand the wool of the sheep retains all its nature the same as in England, particularly its strength, and felting qualities among the hatters, which assures me that rabbits wool from those bred in Upper Canada will do the same; and there are some million of acres within the latitude and boundaries which I have before described, suited to the nature of the warren rabbit; nor do I apprehend that the wolves, foxes, &c. of Upper Canada will be half so destructive as the poachers in England.

The Guanaco,

or camel-sheep of South America, no doubt will be a national object at some future period. This is a tame, domestic animal, very hardy, and used with much cruelty by the natives in travelling over the mountains with their burthens; it shears a fleece of wool of from 2lb. to 3lb. which

which is of dusky red on the back; on the sides inclined to white, and under the belly quite white; its texture is very fine, yet strong; its felting qualities very powerful, and is worth, when ready for use, from five to fifteen shillings per lb. This animal would no doubt thrive, and do well in England, Upper Canada, and in particular I should suppose in New Holland.

The Beaver

might be propagated to great advantage in Scotland, Ireland, and the northern parts of England. It is an animal, when tamed, very familiar, and will eat bread and milk, willow-sticks, elm, bark, &c. and no doubt might be imported with safety; but as these two last-mentioned animals are not likely to be attended to immediately, I shall say no more respecting them for the present.

Pine Timber.

There are many thousand of large pine trees on the borders of the lakes, river, &c. in Upper Canada, which might be marked and secured for naval purposes, and which might be floated down to Montreal and Quebec with great ease, and which no doubt would be of great benefit in furnishing a large supply of good masts for the navy of this empire.

I am, Gentlemen,

With respect,

Your obedient Servant,

WILLIAM BOND.

To the Society of Arts, &c.

London, Nov. 3, 1806.

The

The THANKS *of the* SOCIETY *were voted to Mr.* WALTER BAINE *of Greenoch, for the Continuance of his Endeavours to promote the British Fisheries, and to improve the Method of curing White Herrings, with a View to render them equal to the Dutch.*

The following Communications were received from him, and convey further Information on the Subject noted at Page 402 *in the 22d Volume of the Society's Transactions.*

SIR,

MY attention to the cure of herrings has led me to discover, that the superiority which the Dutch herrings have attained is in a great measure owing to their mode of fishing in the deep sea; and, that though we may in our loch fisheries cure partially as well as the Dutch; yet, in general, it will not be in our power, unless we follow the same mode of fishery. I wish, therefore, to get two or three vessels fitted out in their manner. It is not only the improvement of the cure that would attend an introduction of the Dutch mode of fishing, but many other great national advantages, which will readily occur on consideration of the subject. I have forwarded to you six firkins of herrings, as specimens of north Highland herrings, cured in the Dutch way; they are gutted precisely after the Dutch method, indeed by Dutchmen; but, from the failure of our fisheries, they have been much longer, say above four months, in the first cure than they ought to have been; and from this and other circumstances, they are not nearly of such good quality as can yet be produced. I expect to be able to send to you in a few

a few weeks, a few specimens of Irish herrings, of a large size, cured after the Dutch method.

Ministry have now taken up the business of the fisheries seriously; and it is therefore to be hoped, the introduction of the deep sea fishery will be fully considered of. Dr. Jeffray made an application lately to the Privy Council, for one or two of the Dutch prize fishery vessels at Yarmouth, and which application is still pending. If they could be procured on liberal terms, I would engage to fit them out next season; and if such experiments are to be encouraged, measures should be immediately taken to prevail on part of the Dutch fishermen now prisoners in this country, to assist. It was, in a great measure, by the Dutch fishermen who were procured last war, that the curing has become so much an object of attention since.

I am, respectfully, Sir,

Your obedient Servant,

WALTER BAINE.

Greenock .. 12, 1805.

To C. TAYLOR, M. D. SEC.

SIR,

AGREEABLY to my last communication, I have forwarded to you specimens of the Irish herrings I then expected. They are cured as near to the Dutch method as, from the knowledge I have of it, is in my power; to form a proper judgment of their cure, it is necessary that they contain the brine, and care ought to be taken in opening them not to lose it. It is also necessary to observe, that in judging

judging of the cure, it is to be considered that the herrings now sent are not in condition, being caught just in the spawning season; that, therefore, they will not sell here for inland consumption. Of two thousand barrels which have been brought to this port within a month from the Irish fishery, there have not been twenty barrels of them yet sold for home consumption. The circumstances of this fishery offer another strong argument for introducing the deep sea fishery. The herrings which might be caught in it, set into the different creeks on the west coast of Ireland, in the months of December and January, to spawn; they continue on the coast for a few weeks, during which they are caught in great abundance, and they suddenly disappear. A few nights previous to their going off, the water is perfectly thick with their spawn; and this is always considered a sure indication of the failure of the fishery. There can be no doubt of these herrings being in the deep sea off the coast in the summer and fall, and that they could be caught there, in their best state, after the Dutch method. But what will any improvement in our mode of fishing and cure avail, when the article of salt is to be burdened with such enormous duties? Under such circumstances the fisheries may barely exist; but they never can become, as they otherwise might, the great nerve of the country.

The heavy obligation that will now be required to procure salt for fishery purposes, will put it out of the reach of the poorer classes, particularly the inhabitants on the north-west coast of Scotland, whose situation it was understood to have been the anxious wish of government to meliorate, and to prevent their emigration.

The most wealthy will be deterred from engaging in the fisheries, from the great danger and risk arising from

the vexatious excise regulations and restraints to which they will be subjective. The revenue boards will now consider the persons engaged in the fisheries as objects of their jealousy, and the least irregularity will be made a handle for grievous prosecutions. But notwithstanding the pernicious effects these duties will have on the fisheries, the object of imposing them will not be accomplished in the manner government expects, as far as relates to Scotland. Smuggling will be carried on to a greater extent, and there will be less revenue on the article in Scotland than formerly, from the great temptation and advantage it will afford to smugglers. The first cost of common fishery salt is now fourpence halfpenny per bushel at the works at Northwich; it stands on board at Liverpool about sixpence per bushel, the duty on which is fifteen shillings. In the Isle of Man, salt is duty free for every purpose. To smuggle it from thence the person only runs the risk of losing it; but if he save only one tenth of the quantity, it may be made a trade. In corroboration of what is stated, as to the effects of the salt duties on the fisheries, the Board of Excise instituted prosecutions last year, which, if they had accomplished their object, would have ruined the first adventurers here and in Leith; though the Board admitted they had no information of fraud, or could make out such charge against them; and the Board would in a great measure have accomplished their aim but for the interference of the Treasury, procured with great exertion.

I am, with respect, Sir,

Your most obedient Servant,

WALTER BAINE.

Greenock, March 15, 1805.

To C. TAYLOR, M. D. SEC.

SIR,

SIR,

I AM still prosecuting the business which is the subject of our correspondence, and have acquired considerable additional knowledge in it since last season. I can now procure brine in taste, flavour, colour, and consistency, equal to any Dutch brine: this has been hitherto the great desideratum in our cure.

Our plans of curing this season are much more complete and extensive than formerly, the herrings are of a much better size and quality, and the prospects of fishing more flattering. I am of opinion the herrings forwarded you last season would not give the satisfaction I could wish, as the herrings were poor of themselves, and the method in which the greater part of them were cured, and in which the astringent principle was employed, I find will not do, and have given it up entirely. If you choose, I will send you some specimens of the herrings I have lately cured, and which I think you will approve of. I am anxious to see the publication you noticed to me of the Dutch placart respecting their herring fisheries; and beg, as a particular favour, that you will procure it for me.

I am, respectfully, dear Sir,

Your obedient servant,

WALTER BAINE.

Greenock, Aug. 31, 1805.

N.B. The Society, on examination of Mr. BAINE'S herrings, found them much superior to the white herrings usually procured from the British fisheries, and equal to

the Swedish, but rather inferior to the Dutch. The casks were opened at different times; and in some of the barrels kept and examined by the Society three years after the fish were caught, and salted, the herrings were yet in good condition.

The following Publication having been lately under the Consideration of the LORDS *of* HIS MAJESTY'S PRIVY COUNCIL *for* TRADE *and* PLANTATIONS, *and being the Account particularly requested by Mr.* WALTER BAINE, *is annexed with a View to explain the Method in which the Dutch Herring Fisheries have been conducted, and to convey some useful Hints for Improvement of the British Herring Fisheries.*

A TRANSLATION *of the* DUTCH PLACART *and* ORDINANCE, *for the* GOVERNMENT *of the* GREAT FISHERY.

The PLACART *and* ORDINANCE *concerning the Catching, Salting, Landing, Curing, Packing, Heightening, and Laying of the Herrings, &c.*

The States of HOLLAND and WEST-FRIZELAND to all to whom these Presents shall come, greeting.

SINCE, by the obsoleteness of the laws, the orders formerly given for taking and loading of herrings are not duly maintained, as some people, for their particular profit, catch

catch them before the due season, and salt, send them to market, and sell them, before they are of a proper growth, and fit for the market: and forasmuch as some people, the better to cover their misdemeanors, send them directly to the eastern markets, from sea, and transport them inland, without their being first reported at the customary places, where daily attendance is for that purpose given, which not only causes in these, but in other countries, great disgust to the commodity, and dishonour to the dealers therein, the fish not being then in their full relish and perfection, which occasions those which are good to be suspected and unsold.

And whereas those so caught are neither well salted, sorted, nor properly laid in the barrels, to the great loss, damage, and prejudice of the merchant, the ruin of the herring trade, and of the general consumption.

And whereas this great fishery is the principal mine, and chief support of these countries, and of the inhabitants therein; therefore, and in order to remedy the growing evil, we, with the deputies of the cities, &c. concerned in the herring commerce, do make and establish the following orders.

In the first place, no person shall wet their nets in the sea, or begin fishing before the feast of St. John the Baptist, being Midsummer-day, N. S. or continue fishing from thence, longer than until the 31st of December following inclusive, under the penalty of 200 guilders *, and loss of the herrings taken, or value of the same; and that the several vessels so fishing, in conformity to this ordi-

* A Guilder is 1*s.* 9*d.* 86 Stg.

nance, is to be certified to us on the oath of the masters, and of two of their respective crews.

2. Excepting always from this prohibition, such vessels as go upon the Dogger-Bank to fish for cod; those may sail before Midsummer-day, and may catch herrings, provided they take no more than may serve for the crew's present spending; but they shall not, before the said 24th of June, salt them in pots, jars, or barrels, or bring on shore any uncured, or unsalted, nor sell any at sea or on the land, make presents of, or otherwise distribute or dispose of them. And the masters of such fishing vessels, so designing for the Dogger-Bank, are, before they sail, to appear before the magistrate of the city or place from whence they sail, and on their solemn oath declare, that they will not cure, salt, pot, or barrel, or otherwise preserve herrings, or connive at any of their crews so doing, until after the 25th day of June, the day next after the feast of St. John, or Midsummer-day, nor will bring them into port, sell, distribute, dispose, or make presents of them, in any manner whatsoever.

And such master, on his return, shall declare to the magistrate by solemn affidavit, that he has not broke, but kept holy and conscientiously the oath taken by him on his outset, under the penalty of 600 guilders, to be made good by the ship and cargo, any time within one year and a day; and the owners may have their redress over against the master, who shall likewise suffer corporal punishment, according to the greatness of his crime. The fine to be divided; one third to the proper officer, one third to the poor, and the other third to the informer; and the herrings to be forfeited, unless taken

taken aboard the vessels by the captain of the great fishery, who shall cause them to be thrown into the sea.

3. No ship or boat shall sail out to catch herrings from Holland or West-Frizeland to the north, nor go into deep water, without the master's having first taken out an act of consent, who, on the procuring such an act, shall make oath, that they will not sell or make present of such herrings at sea, nor salt nor cure them on shore, or aboard, under penalty of confiscation of the fish, and of the sum of 25 guilders each barrel. And that the herrings caught of the one night shall be separated from those caught in another, and shall declare which are of each night distinctly, on forfeiture of the vessel and cargo, and degradation of the master.

On the second outset, the vessels shall not put to sea before the 14th of September, nor fish before the 20th of the same month, at which time the masters may put their herrings aboard other ships, and assist one another in the hauling in of their nets.

In case any shall surreptitiously procure an ordinary act of consent, such shall be liable to all the penalties above recited.

4. None shall sell or truck for herrings, but to those who are authorised by the proper magistrate, nor but where the herring trade is established; and the master and two or three of the mariners shall inspect the printed ticket, hereafter specified, in order on their return to make their report, pursuant to the contents of the sixth article. And in case any body shall, when at sea, put herrings on board other ships than as above directed, the master shall forfeit the said herrings, or their value, and beside pay a fine of 600 guilders, to be levied upon the ship or goods, and the owners

to have their remedy over against the master, who shall likewise lose his office, and be declared incapable of future service.

5. All such as are inclined to follow the busses in vent jaggers to take off their fish, shall first procure of the port-magistrate, where they sail from, an act of consent to follow that traffic, until the 15th of July, of the first fishery, and no longer; provided likewise that they take out from the proper office a ticket, with herring-buss printed at the top, with the date of the year, sealed with the seal of the great fishery, and signed by the city secretary. Provided they promise at the same time upon oath, not to take on board any pickled herring, but from busses of Holland and West-Frizeland; and shall bring with them into port, certificates from the respective masters from whom they purchase fish, signed likewise by two or three mariners of each vessel, with the name of the port they sailed from, the ship's name, the quantity delivered, that they were caught after Midsummer-day, and salted, cured, and laid in barrels in his ship, on forfeiture of the herrings, or the value of them.

If any should, without being supplied with an act of consent, take on board herrings, which they may do, if caught after Midsummer-day, but they shall declare the same on their oath, and on the oaths of two or three of the mariners, that such herrings were caught after Midsummer-day, under the penalty above said.

And all masters are hereby interdicted from putting any herrings on board the vent jaggers after the 15th day of July, under the penalty above, and also of the money received for such herrings, at the risk of the purchaser, and the owners to be totally acquitted.

6. Neither the vent jaggers, nor busses, shall carry the fish

fish they purchase or take any where but to Holland or West-Frizeland, where the barrels, after visitation, are to be marked or stamped with a hot iron, on forfeiture of the herrings, or their value, and under the penalty of 200 guilders.

Before the master, at the completing of his voyage, shall break bulk, he shall, with two or more of his crew, declare upon oath, in the form hereafter specified, what herrings they have sold at sea, and to whom delivered; whether they had an act of consent to pursue the trade; how much fish were landed at each adventure; that they were caught after Midsummer-day; and cured, salted, and barrelled within their ships, only carried into Holland, or West-Frizeland; also duly reported there; and that before Midsummer-day they neither wetted their nets, nor put any fishing-tackle into the sea. Those who refuse the reporting, not only the last, but former voyages, shall forfeit the unreported herrings, or the value thereof. Every such oath shall be registered in due form, and the officers and committee of the great fishery may, on application, have authentic copies delivered to them.

7. No inhabitant of Holland or West Frizeland shall engage in any share, or part of vessels, set out as fishing busses, or vent jaggers, the property of persons inhabiting out of the said provinces, under the penalty of 600 guilders, and the confiscation of ship and cargo. The information to be deemed good, though made twenty years after the fact committed.

8. The captains of the men of war attending this fishery, are hereby authorized, that in case any master of a buss should, without an act of consent, sell any herrings to the Zealanders, or to any inhabitants of the United Provinces, not of Holland, or Frizeland, or to any foreigners; or who shall

shall sail from the fishing-grounds directly eastwards. As such facts shall come to their knowledge, they are hereby empowered to arrest such offenders and send them in prisoners.

9. The first caught herrings shall not be sold until they have lain ten days in pickle; and to ascertain the same, the cure-masters and overseers shall mark the cask with a circle round it, between the neck hoop and belly hoop, or in default thereof forfeit 300 guilders for each barrel, one half to the informer, the other to the proper officer; and such who cannot pay the fine, shall be confined to bread and water for a month; and all herrings which come into the provinces, without such circular mark, for consumption, shall be thrown into the sea.

10. Each buss-master shall have his particular mark on such barrels as he intends to land, or that he puts on board other vessels, which mark shall be put on the bung-stave, or the next to it; and he omitting such mark, shall forfeit six stivers * each barrel.

11. Every buss-master is to declare, at the secretary's town clerk office of the port wherefrom he sails, where they intend to fish, what port return to, and what mark they use, in order that the sums may be duly registered, under the penalty of 120 grote †.

12. Each buss-master shall take care, that in packing the herrings be laid close and even; and that whoever is guilty of any fraud, by pressing them with baskets or trays, shall be fined 25 guilders, suffer arbitrary correction, and be obliged to make good the damage to the merchant who may suffer by them. And that the buss-master may not be injured by the roguery of the layer, the said layer shall put his

* A Stiver is 1*d*. 0.9 Stg.

† A Grote is 0*d*. 54 Stg.

mark

mark a hand breadth within the barrel, as also on the outside on the uppermost part; and on neglect thereof shall suffer arbitrary correction, provided the same is not purposely neglected by the direction of the buss-master.

13. No one shall lay the herrings cross-ways, or falsify, or change them, put the old under new, lay those bit by sharks, or that are sickly, by the good, nor those which are caught of the one night, by those of another taking; nor shall any which are not salted the same evening they are caught, be afterwards cured, under the penalty of 25 guilders each barrel, and naval discipline.

14. Each buss-master shall diligently attend to the sorting of the fish, by separating the full from the poor ones, and not mixing the sound with the night-refuse, roe-sick, milt-sick, stinking or unsightly herrings; nor to put either of those with the other, in the same barrel, but to lay all the distinct sorts in separate casks, and mark them accordingly.

15. Each fisher shall be obliged to declare for what price he will sell his different assortments, distinctly; and if they should happen to fall short of the contract, the cure-master is to take an exact register of them, and to decide the difference.

The buss-master is not only to mark and distinguish the full sound from the weak, but the great from the small, and also those of the like kind, caught in different seasons, from each other; and is with two or three of his crew, to declare in the register's office on oath, that all his cargo is properly and distinctly marked, and was so before the casks were severally stowed in the ship's hold.

16. The buss-master, according as he finds the seasons, may salt the herrings at his own discretion, and cause the net to be laid as he finds the shoals to run.

Of

Of Curing, Packing, Repacking, &c. of the Herrings.

17. That from henceforth the curing of the herrings shall be perfected within three weeks after coming into port, or after they are sold to the merchant, and shall be repacked once or more, according to the custom of the place, and nature of the herrings; but if the curing is not perfected within three weeks, the buyer shall not pretend to any abatement.

18. The buss-master and book-keeper are expressly interdicted from concerning themselves in the sale of the herrings by taste at the bung-hole; they are only to dispose of them by pack and keur, *i. e.* by wholesale as they arrive, on penalty of paying 50 guilders per last, and confiscation of the fish; one third to the informer, one third for the officer who executes the process, and one third to the poor.

19. No herrings shall be datumen, *i. e.* given gratis. If so found, they shall be confiscated, one third to the informer, one third to the officer in execution, and one third to the poor; and the person who so cured them shall lose his office.

20. No herrings shall be heightened with fresh pickle, nor repacked but in the public street, on the keys, or in such places as are customary, with open doors, where any body may go in or out; and whoever packs, &c. with the doors shut, or hinders any body coming in, shall forfeit 240 grote to the proper officer, as often as found guilty.

21. The cure-masters are to take special care, that no nasty, wrack, unsightly, roe-sick, milt-sick, or other indisposed herrings, shall be used to fill up or heighten the barrel; but each, in their different order, to be filled with herrings of the like kind, in the penalty of 120 grote each barrel,

barrel, whereto the merchant, packer, filler, and every one in particular concerned in packing are alike liable. And that this may be more commodiously effected, it is ordered for the future, that no herrings shall be packed or heightened to be sent beyond sea, before that the cure-masters do inspect and ascertain, that the herrings are packed in due order as abovesaid. And further, to prevent fraud, the place-master where the herrings are packed, &c. shall set his mark on the cask, between the third hoop and the neck hoop.

It is likewise expressly forbid to pack small sweet-wrack herrings with the great, but each shall be heightened by those of the like nature and season of taking; and according to the different sorts and takings, the casks are to be branded with such different marks upon the belly, as is by this ordinance specially directed, as also the city mark.

22. The coopers are in packing to dispatch the bad and unfitting barrels first, for present expending; but for the keeping herrings, they are to take good barrels, to the liking of the merchant, or of the cure-masters, who are to see it done, and, in default, the herrings are to be taken out and repacked without any expense to the merchant, and the offender to pay four grote Flemish each barrel.

23. The coopers shall not hoop branded or other repacked casks with half barrel or green hoops, but with good whole barrel hoops, made the March preceding.

24. No barrels which are to be sent abroad, shall have less than fourteen hoops.

And whereas, it has been discovered to have been heretofore a practice, to pack the several sorts of herrings in unlawful barrels, to the great detriment of this profitable commerce, it is therefore forbid, for any body hereafter to pack herrings in salmon casks, or other unfit vessels, but solely

solely and simply in barrels made and burnt conformable to the ordinance published, concerning the making, curing, and burning of the barrels, on penalty of confiscation of the herrings, and for each stave, small or large, 20 guilders for the informer, officer, and poor.

25. Also that any servants of the packers, coopers, or other officer, who may pack in salmon or other unlawful cask, shall immediately be discharged their places.

26. We also forbid to pack in any barrel, salt, spice, or or other commodity, under cover of brand, wrack, or other kind of herrings, to be sent westwards, under pain of losing the said barrels, and all which is therein contained, besides to pay 100 guilders, and to suffer corporal correction; as also to make good the damage which the merchant or skipper may suffer thereby; and the porters or servants employed therein, shall suffer as in the foregoing article.

27. The herrings caught after St. James's-day, and salted with fine salt, may be exported for wrack westward, as has been formerly accustomed; the barrel to be bound with sixteen hoops, the date of the year upon the belly thereof, without letters or cyphers, and the mark of the purchaser thereon.

Of Salt.

28. No Spanish or Portugal salt shall be stowed into chests or barrels, before the cure-master has examined and found it good, under the penalty of 25 guilders for every hundred weight.

29. No buss-master shall carry to sea, for the use of the herring fishery, any other but Spanish or Portugal salt, twice examined by the cure-master, who shall open

open every barrel before it goes on board, see them filled up, and stamp his mark thereon; and the buss-master being proved to have cured herrings with salt not twice inspected, to forfeit 36 guilders. And the said buss-master is in his certificate to declare, that the herrings are cured with approved Spanish or Portugal salt, before they are set to sale, or the barrels filled up.

30. The buss-master is, at the request of the cure-master, to open his barrels, and close them again, in his view; who may have two inspections, and at each time the fee of half a farthing each barrel; the first time to be paid by the seller, the last by the buyer.

31. If any fraud shall be discovered in the barrelling of the salt, the seller shall forfeit 200 guilders; one third part to the officer, one third to the fishery, and one third to the poor.

32. Any person found curing of herrings with French salt, whither from Senters, Olderdome, Borcus, St. Martin's, Brouwart, South-France, West-Indies, or the Isle of May, shall forfeit the herrings.

33. Fish caught after St. James's and Bartholomew tide, shall be salted with fine salt, made from boiled sea water, according to the contract made with the city of Cologn.

34. No white small salt shall be received, but with a certificate from the maker, and taking an oath before they use it, that the salt is not changed after receiving it on board, on forfeiture of the salt, or value thereof; and if found guilty of perjury, to be punished, according to the direction of the ordinance heretofore agreed upon with the deputies of Cologn.

35. There shall not be sent abroad, to France, Flanders, Brabrant,

Brabrant, and so on westward, any barrels of herrings otherwise marked than with the grand Rouen brand, and fished and packed after Bartholomew tide.

Nor shall any herrings be exported to Bremen, Hamburgh, Cologn, or other places that way, cured with coarse salt, whether full or slender fish, wrack or refusal, under penalty of forfeiting the herrings, or value of the same, and a fine of 6 guilders each barrel, and naval correction.

36. Packers, coopers, and place servants, for the same crime, to be discharged, and declared infamous; nor shall they afterwards be admitted into any services in these provinces.

37. All herrings sent to Hamburgh, and in that course, must be branded with the seller's mark, and the cypher of the year. All others with the single brand only, as is before directed.

38. Herrings once exported abroad, shall not be received back, to be filled or cured anew, on pain of confiscation.

39. For the preservation of this most important and advantageous branch of commerce, no one shall, in these provinces, land, pack, or otherwise cure or prepare any Maesterlandish or other foreign herrings, but only coopered up in casks, and sent away, in the same condition as imported, under pain of confiscation.

40. All penalties, the division whereof is not previously specified, are to be one third to the informer, one third to the officer executing the process, and one third to the poor.

41. And that no buss-master may plead ignorance of these our ordinances, they shall be obliged to take authentic copies with them to sea.

42. No

42. No officer or fiscal shall compound with delinquents, without the express approbation of the burgomaster or treasurer of the city, or place where the crime was committed; and if such composition be made without their consent, the same is hereby declared illegal and void; and the burgomasters, &c. may pursue the offender, and recover the penalty notwithstanding; and apply the one third part, usually appropriated to the officer who executes the process, to the use of the city.

43. The deputies of the cities trading in the great fishery, may, in the future, make such bye laws as they find conducive to the welfare of this lucrative branch of commerce.

And as we are clearly apprised, that all the foregoing articles are for the preservation and bettering this beneficial branch of trade, therefore we do command all and every one, whom it may concern, punctually to observe these our regulations, under the pains and penalties affixed to each article, in case of contravention. And as we well understand these our ordinances, so will we they be duly executed against the contraveners. And that no one may plead ignorance of the same, we do hereby command and authorise our head door-keeper, or beadle of our court of justice in Holland, to publish the substance of these in all the cities and places of Holland, and West Frizeland, wherever it shall be necessary.

Done at the Hague in the form of a Placart Geresumeert, and attested under the common seal of the States of Holland, the 10th of May, 1651, and again renewed, and the second article amplified the —

By Order of the States.

The Form of the Oath to be taken by the Buss-Master, trafficking in the Herring Fishery, in order to his obtaining the Act of Consent.

I, A. B. master of a herring ship, and two or three of my seamen, do promise and swear, that we will not, before the 24th of June, nor after the 31st of December next ensuing, any herring nets throw into the sea, nor before wet them to catch herrings.

Secondly, That I will not personally, or by connivance, do, or permit any herrings to be delivered at sea, to any person or persons whatsoever, out of my vessel, directly or indirectly, but only to such ships from Holland and West Frizeland, which have and produce the due act of consent. At the top printed "*A Buss,*" and underneath the seal of the great fishery, and signed by one of the Secretaries of the under-mentioned cities, viz. Delft, Rotterdam, Scheidam, Briel, and Enchuysen, to whose ships I shall, to the 15th of July, and no longer, deliver herrings; nor put on board each vent-jagger more than one small barrel of fish for the book-keeper.

Thirdly, the barrels shall not be more than once packed and heightened; and special care taken to preserve the bloody pickle, nor waste the same as little as possible.

Fourthly, I will take due care that the herrings are laid even in their rows, not thrown in with baskets or trays confusedly, nor the kinds mixed, bloom laid, or falsified.

Fifthly, That I will not, new herrings caught in the one night, mix with those taken of another; but will specially declare what herrings are taken each night distinctly.

Sixthly,

Sixthly, That I will not sell or barter in Shetland, or at sea, to, or with any foreigner, salt, pickle, barrels, hoops, staves, fishing tackle, yarn, lines, or any other fishing appurtenants, for any kind of merchandize whatsoever; nor make presents of, or connive at any being made by the ship's crew, directly or indirectly. And farther, that my ship's crew shall have no more for a present, than each a small kinelkin, or one eighth of a barrel for each voyage. And that I will in all things govern me according to the directions of the placarts and ordinances regarding the herring trade, which have been delivered me.

So verily help me God Almighty.

The Form of the BUSS-MASTER'S *Oath after his Return from Fishing.*

Appearing this day before the Lords N. N. N. N. in the city of I, A B, and C D, E F, G H, my own mariners, respectively on our solemn oaths declare, that we did, in conformity to the act of consent, duly equip a ship for the herring trade; and no fishing tackle, before the 24th of June, did throw into the sea, or shot out, or wetted: nor have delivered out of the vessel, herrings to any person or persons whatsoever; nor have caused or connived at any such thing being done, directly or indirectly, in any manner or form whatsoever; except only to such ships or vent-jaggers of Holland and West Frizeland, who have produced a qualified act of consent, which we perused: nor to them after the 15th of July last: nor have fished for, or caught any other herrings

but what are specified in our report, delivered in to the treasurer.

Lastly, I, A. B. do declare, that no more has been given to each mariner of my crew, than one kinelkin, or eighth part of a barrel of herrings, each voyage.

So verily as God Almighty must help us.

The Oath taken by the BUSS-MASTER, *and his Crew, on their Outset to the* DOGGER-BANK.

I, A. B. sailing with fishing tackle upon the Dogger trade, and all my mariners, promise and swear, that we will not carry with us this voyage any more than twenty nets: that we will not catch any herrings before St. John's Day; nor before that time will gut, salt, nor put any in pots or barrels; nor deliver any at sea, gutted or not; nor bring any home to sell, make presents of, or otherwise distribute.

So verily help us God Almighty.

The Oath of the same, on their Return from Fishing on the DOGGER-BANK.

We do hereby declare on our solemn oath, in consequence of that previously taken, that we have not, during this voyage, had on board any more than twenty nets; nor before St. John's Day did gut, salt, pot, barrel, lay up in any vessel, give away or bring home; nor have nor shall bring ashore any herrings for to sell, make presents of, or distribute in any ways howsoever.

So help us, &c.

Oath

Oath of the VENT-JAGGERS *.

We promise and swear not to take on board, from any ships or busses but those of Holland and West Frizeland, any herrings, nor purchase from them, but such wherewith a due attestation is given, signed by the masters and two or three of their mariners respectively; and wherein is contained the quantity, and an assurance of their being gutted, salted, and laid, according to the direction of the placart: nor such herrings taken on board will we carry any where, but to such cities or places in the said provinces, where brands and certificates are given: nor will we our act of consent deliver or lend to any person, to make use of at sea; nor after the 15th of July will take any herrings on board, directly or indirectly, except one eighth of a barrel from each buss for the book-keeper, under the penalties in the placarts and ordinances, concerning vent-jaggers, contained.

And we do further promise and swear, that we will not sell, make presents, barter, truck, or otherwise howsoever dispose of any salt, pickle, barrels, hoops, staves, fishing-tackle, nets, yarn, fishing line, or any other materials in the fishery, nor merchandizes of any kind or denomination, to the people of Shetland, or other foreign nation whatsoever, nor connive at the same being done, directly or indirectly.

And finally, we promise immediately after our return home, to take the oath of purgation.

So verily, &c.

The Oath of Purgation.

I, A. B. and two of my mariners swear, that the oath taken by me on receiving the act of consent, has been

* The vent-jaggers are the persons employed on board vessels which fetch the pickled herrings from the fishermen, and carry them on shore.

duly observed in every point, without neglecting the least part thereof.

So verily, &c.

The ACT *of* CONSENT.

We the Burgomasters and regency of the city of consent, that may sail with his herring-buss to the North Sea, there to follow the herring trade, and has sworn before us, that he is duly equipped with fishing tackle, salt, barrels, mariners, and all other requisites belonging to that commerce, according to the burthen of his vessel; and that he will not, before the 24th of June, nor after the 31st of December next ensuing, put into the sea any fishing tackle, nor wet them to catch herrings; nor will himself, nor connive at others putting fish on board any vessels, other than of the provinces of Holland and West-Frizeland, having an authentic act of consent, with an "*herring-buss*" printed on the top, and at the bottom the printed seal of the great fishery, and signed by the secretary of the city from whence he sailed; in which vessel he may to the 15th of July inclusive, put on board the herrings he has taken. And that he will exactly set down upon the schedule the mark of the barrels, and the night of the fish being taken, which he so disposes of; and that he will not pack or heighten the barrels with crooked herrings more than once, and take care that as little pickle be spilt as possible; that he will land his fish only in the provinces of Holland or West-Frizeland, and with three of his mariners report his cargo within three days after his return; that his herrings are laid in even rows, from end to end, not flung in with baskets or trays, nor mixed, laid crossways, or falsified; that he, no salt, pickle, barrels, hoops,

hoops, staves, herring tackle, yarn, lines, other fishing furniture, or merchandizes of any denomination, will sell or otherwise dispose of in Shetland, Scotland, at sea or on shore, to any foreign nation whatsoever, or connive at the so doing, directly or indirectly, under the penalties in the ordination mentioned; and that he will always govern himself according to the placart and ordinances made in behalf of the herring trade, the which are given him for his better direction herein.

So verily must God Almighty help him.

In witness whereof, the seal of the great fishery is hereunto affixed, and signed by our city secretary, the day of

N. N.

(A printed Herring-Buss.)

We the Burgomasters of the city of consent and admit with his ship to sail amongst the busses and herring ships, and take on board herrings from them, until the 15th of July, and no longer, conformable to the ordinances made in the behalf of the vent jaggers; and that all the herrings which he shall take on board at sea, shall be only from the busses and ships of Holland and West-Frizeland, and that he will of each master take an attestation signed by him and two or three mariners, mentioning the quantity of herrings put on board, and that they were caught, gutted, salted, and laid in the barrels, according to the direction of the placart. As also that he will not receive on board any herrings to make presents of, except a small kinelkin for the book-keeper, nor carry his herrings any where but where there is brand and certificate, nor will lend to any one his act of consent, nor will sell or make

presents of, barter or exchange any salt, pickle, barrels, staves, hoops, fishing tackle, nets, yarn, line, or any other thing belonging to the fishery, nor any kind of merchandize, either at Shetland, Scotland, nor any where else, at sea or on shore, nor to any foreigner, directly or indirectly, and that he will take the oath of purgation immediately after his return.

So verily God must help him.

In witness whereof, at the top, is printed a buss or ship, with the date of the year, and at the bottom is printed the seal of the great fishery, and signed by our secretary, the day of

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Instructions for the Mates, against not rightly managing, sorting, salting, and laying the Herrings.

The deputies of the great fishery and herring navigation of Holland and West-Frizeland, being credibly (and with great indignation) informed, that some mates neglecting their duty, do not rightly manage, sort, salt, or lay the herrings, notwithstanding the good orders instituted by the general placart, relating to the catching, salting, and managing of herrings by their Noble Great Mightinesses, dated May 10, 1651, lately renewed and explained especially by the 12, 13, 14, and 15 articles; a copy of which, agreeably to the 41st article of the said order, is yearly delivered to the said mates, and which they solemnly swear to, as a warning, in order to prevent all abuses and misdemeanors, as it is ordered by the said deputies, by virtue of the said placart; by which, it is to be feared, that the vending and good reputation of Dutch herrings in foreign markets, already decreasing, may entirely come to cease, and on the

contrary

contrary be despised, to the great loss and damage of the trade, and of consequence to the ruin of the common herring and great fishery, it being so essential a branch of the commerce and welfare of these countries, and inhabitants thereof, if it is not speedily and strictly prevented; the said deputies, with the advice and concurrence of some of the owners, stewards, and merchants in the herring trade, have agreed and ordained, in order to prevent those gross abuses and neglect of duty, for the preservation and re-establishing the herring and great fisheries, as they do by these presents ordain, by way of renewing and explaining the beforementioned good orders, that the mates of the herring vessels shall not mix several sorts of herrings together, but shall sort them properly, viz. full with full, measure with measure, and small with small. The mates shall, upon account of extraordinary large quantities catched, and want of time to sort herrings properly, upon their arrival, enter them as unsorted herrings. Further, they shall salt the herrings properly, and the large ones not less than four barrels of salt to a last; excepting only the small barrels; as likewise clean them, and afterwards lay them crossways in the barrels. Commanding every mate to govern himself by this exactly, upon the penalty (over and above the action upon the case of perjury) of 300 florins, for every mate whose herrings shall be found not sorted in the manner above mentioned; and he shall not have any certificate to go on the herring fishery afterwards. But with regard to the not laying the herrings crossways in the barrels, a penalty of six florins each barrel. The said penalties to be applied agreeably to the 40th article of the above placart, one third to the informer or informers, whether mariners or other persons, one third to the officer who shall take the information,

information, and, lastly, one third to the poor. Moreover, the bad sorted herrings, viz. the full mixed with measure, as also measure mixed with full, shall be marked as unsorted, and with regard to the full and measure mixed with small, they are to be sold as small, and shall be accounted and paid for as such by the buyer. The above orders and penalties to remain in full force, and at the risk and charge of the mates. And to the end that no body shall plead ignorance, the deputies have ordered these to be published and and affixed at the proper places.

Done at Delft, by order of the said deputies.

The Burgomasters and rulers of the city of Scheidam, do give consent to , that he, with his herring vessel, may sail to the Northern Sea, to exercise his herring fishery there, and he has swore by solemn oath, that he is equipped with proper tackle, salt, barrels, men, and other utensils proper for the herring fishery, according to the bigness of his vessel; as also, that he will not throw out any herring tackle, nor make any before the 24th of June, nor after the 31st of December next; also that he will not deliver to any body whatsoever any herrings at sea, nor suffer any to be delivered out of his ship by any other person, directly or indirectly, in any shape, but to such vessels only coming from Holland and West-Frizeland, as shew a proper certificate, with a herring-buss at the top, and at bottom the seal of the great fishery, and signed by the secretary of the town where he comes from, to which vessels he may deliver his herrings until the 15th of July, and no longer. That he shall express in the list, exactly the marked barrels, and what night the herrings he delivers were caught: further, that he shall not fill up his barrels more than once with other herrings, and take care

that

that as little of the blood pickle as possible shall be let off: and further, that he shall bring all the herrings he catches in the province of Holland and West-Frizeland, as likewise together with three of his seamen, faithfully to enter the said herrings three days after his arrival at the longest; also, that he shall take as much care as possible that the herrings are laid even from one bottom to another, and that they are not thrown into the barrels with baskets or shovels, nor mixed or falsified. That he shall not carry on shore in Shetland, Scotland, or other places, nor sell to any foreign nation at sea, nor exchange or make presents of any salt, pickle, barrels, hoops, tackle, thread, hook tackle, or any other fishing tackle, nor any merchandize under what denomination it may be, nor take any goods upon freight out or homeward bound, nor suffer it to be done directly or indirectly, on pain as mentioned in the instructions; and shall farther regulate himself according to the placarts made relating to the herring fishery, which are delivered to him for that purpose.

So truly might God Almighty help him.

In witness whereof, the seal of the great fishery is put hereto, and signed by the secretary of the town.

The THANKS *of the Society were this Session voted to Dr.* ALEXANDER ANDERSON *of the Royal Botanical Garden of St. Vincent, for the following Communications received from him.*

SIR,

FROM my long silence you will conceive me either neglectful or ungrateful to the Society, but this is not the case.

The

The reason is, I had nothing of consequence to mention relative to the garden, and it would be trespassing on your time, and interfering with matters of consequence by troubling you with trifles.

Although I have introduced a number of plants in the course of last year from different quarters, yet few of them are yet known to possess valuable properties, except some useful woods.

I am grieved to inform you, that I have lost one of my nutmeg trees; unfortunately the other, which prospers luxuriantly, turns out to be a male plant, consequently worth nothing. I blame myself, in some measure, for this loss, by taking too much care of it, and not letting nature take her own way. Unluckily the war precludes any correspondence with Cayenne, or I would have replaced it from thence. The same cause has cut of all supplies from other parts. Through the medium of a gentleman who was here last year from Cuba, I expected to have had, before now, some of the productions of Mexico and adjacent parts of the continent, particularly Myraxylon, or Balsam of Peru; however, if I do not procure it through that channel, I have found out another from whence I have hopes.

The Gomertur Palm, which produces the material for cordage in the East Indies, is thriving here surprisingly, and, I think, might be rendered a valuable production to these islands. The mode of its producing the fibrous web, and the guard or protection surrounding, clearly points out that nature intended it for the use of man; one tree produces an astonishing quantity. I think the fibres from the plants in this garden are stronger than the specimens I have seen from the East Indies. A small piece of the web, with its protector, I now transmit you. I have great reason to think

that

that but few plants have been raised by the planters in the different islands, from the large quantities of seeds I have dispersed amongst them. The fact is, that no attention, except by a few individuals, is paid to any other plant but the sugar cane, and no other is in estimation with them.

The bread-fruit, although one of the most valuable productions yet sent them, is neglected and despised, unless by a few persons. They say that negroes do not like it, and will not eat it, if they can get any thing else; but this is not really the case, as I know, and can declare from experience, that the very reverse is the fact, when once they are a little accustomed to it. The fact is, that the planters hate giving it a place on their estates, as they regard it as an intruder on their cane land, and they dislike any other object but canes. As to futurity, they think nothing of what may be the wants of themselves or negroes three or four years hence. Even their most valuable mill-timber, than which nothing is more daily wanted by them, they are constantly destroying instead of preserving. They import it at an exorbitant rate, and the importation is precarious. With proper economy and management, there are few necessaries for themselves or negroes, but which might be raised on their own estates, instead of importing them from America, unless it be lumber, and, probably, even that might be done in time in the back, cool, and mountainous situations. I am trying what may be done from the pine tribe.

I am happy that many are now paying some attention to the cinnamon, as the demands on me for the plants are frequent, which I impute to the specimens of it which I have shown.

The black-pepper plants have not yet produced; I have them in plenty, and am trying them in various situations,

and

and can easily increase them by cuttings; unluckily I can procure no information as to their culture in the East Indies, or of the soil or situation in which they thrive best.

I send you some more cloves, the last year's produce of two small trees; next year I expect from several others: you will also find inclosed a lump of gum resin from cochola odorata. As it issues in large quantities from wounds in the bark, it might be procured in plenty from Trinidad, if found useful. Trees of it, of enormous size, are abundant there. Other specimens of terra japonica would have been sent with some other articles, if all my attention had not been engrossed about the late addition to the garden: the same cause has prevented me from excursions to other islands for larger supplies of plants. I remain, with most sincere regard,

Sir,

Your obliged and obedient Servant,

ALEXANDER ANDERSON.

St. Vincent, June 9, 1806.

To C. Taylor, M. D. Sec.

SIR,

Since your last letter to me, very little matter interesting to the Society has occurred, and few acquisitions made to the garden subservient to medicine or commerce. War interrupts correspondence in natural history as much as speculations in commerce.

For 18 months past I have had expectations of some useful plants from Mexico, and other Spanish colonies in that quarter,

quarter, by the way of Cuba, but from thence the transportation must be circuitous by North America, and after that subjected to loss and interruption, before they can reach St. Vincent. I have therefore given up all hopes whilst the war continues.

As the Society may be desirous to know the present state of the garden, I have transmitted a catalogue of the variety of plants it contained on the 24th September last; there are many more from different quarters received without names, or those that are known by the aborigines, and I cannot arrange them until they flower. I am, with great respect,

Sir,

Your most obedient Servant,

ALEXANDER ANDERSON.

Botanical Garden, St. Vincent,
Nov. 1, 1806.

To C. Taylor, M. D. Sec.

CATALOGUE OF PLANTS

In His Majesty's Botanical Garden in the Island of St. Vincent, September 24, 1806.

Commercial and Medicinal.

Acorus calamus
Acer saccharinum
Aloe perfoliata
Amomum Zingiber
Asclepias asthmatica
Aristolochia odoratissima
Aristolochia trilobata
——— anguicida
Arnica montana
Bixa orellana
Cactus cochenilifer
Canella alba
Caryophyllus

Caryophyllus aromaticus
Cassia senna
——- glauca
——- fistula
——- javanica
Cinchona cymosa
——- Caribæa
Convolvulus jalapa
——— turpethum
Copaifera officinalis
Coriandrum officinale
——— testiculatum
Curcuma longa
Cycas revoluta
Dorstenia contrayerva
Dracæna draco
Epidendrum vanilla
Fraxinus rotundifolia
——— ornus
Gossypium arboreum
——— hirsutum
——— religiosum
Guaiacum officinale
—— sanctum
Hæmatoxylon campechianum
Kæmpferia galanga
Laurus cinnam
——- cassia
——- camphora
——- sassafras
Mimosa nilotica
——- Senegal
——- catechu
Morus tinctoria
Myristica officinalis
Myrtus pimenta
Olea europæa
Pedalium murex
Piper nigrum
—— longum
—— cubeba
—— Betle
Quassia amara
——— simarouba
——— excelsa
Quercus suber
Rheum compactum
Ricinus communis
Saccharum officinarum rubrum
Sesamum indicum
——— orientale
Smilax sarsaparilla
Thea viridis
—— Bohea
Theobroma cacao-Caraccas.

ESCULENTS

Alpinia globulifera (Maranta ?)
Amaranthus viridis
——— caudatus
——— melancholicus
Arachis hypogea
Areca oleracea
——— alpina
Artocarpus incisus Otaheite
——— E. Indies
—— ——— seminifer
Arum esculentum
——sagittifolium
Canna indica

Canna indica, floribus maculatis
Cleome pentaphylla
Cocos aculeatus
Convulvulus batatas
——— esculentus
Cucurbita pepo
——— verrucosa
Cytisus cajan
Dioscorea sativa
——— alata
——— bulbifera
——— quinqueloba
Dolichos unguiculatus
——— uncinatus
——— purpureus
——— tuberosus
Glycine subterranea
Helianthus tuberosus
Hibiscus esculentus
——— sabdariffa
Holcus saccharatus
——— sorgum
Jatropha manihot
Musa paradisiaca. Otaheite.
Myrosma tuberosa
Oryza sativa
Paripou Palm
Phaseolus lunatus
——— max
——— glaber
Pistacia terebinthus
Ravenala edulis
Solanum melongenum
——— lycopersicon
Sicyos edulis
Tacca pinnatifolia
Zizania palustris

MEDICINAL.

Abrus precatorius
Allamanda cathartica
Amomum sylvestre
——— racemosum
Amyris ambrosiaca
Andropogon schœnanthus
——— insulare
Argemone Mexicana
Asclepias curassavica
——— gigantea
Ballota suaveolens
Begonia obliqua
Bignonia alliacea
——— ophthalmica
——— capreolata
Bocconia frutescens
Bombax ceiba
Capsicum baccatum
——— frutescens
Cassia occidentalis
——— bicapsularis
——— tora
——— herpetica
Chenopodium anthelminticum
——— multifidum
Clinopodium rugosum
Chiococca racemosa
Cissampelos pareira
Cissus cordifolius

Clusia alba
—— flava
Commelina communis
Convolvulus brasiliensis
Conyza lobata
Costus spicatus
Croton flavens
——— argenteum
Dolichos pruriens
Eryngium fœtidum
Eupatorium nervosum
Euphorbia thymifolia
Galega officinalis
Gardenia genipa
Geoffrea inermis
Guilandina bonduc
Heliconia bihai
Heliotropium indicum
Hura crepitans
Jatropha curcas
——— millefida
——— gossypifolia
Ilex vomitoria
Iris martinicensis
Justicia pectoralis
——— procumbens
Lantana involucrata
Lobelia siphilitica
——— assurgens
Melissa officinalis
Mimosa pudica
Momordica charantia
Nepeta pectinata
Nerium antidysentericum
Ocymum americanum
Pancratium cainbœum
Parthenium hysterophoros
Passiflora murucuja
——— lutea
Paullinia pinnata
Petiveria alliacea
Phytolacca icosandra
Picramnia antidesma
Piper Amalogo
—— reticulatum
—— decumanum
—— obtusifolium
—— pellucidum
Plumbago scandens
Plumeria rubra
——— alba
Poinciana pulcherrima
Rauwolfia nitida
Rosmarinus officinalis
Ruellia tuberosa
Ruta graveolens
Scoparia dulcis
Securidaca scandens
Sisyrinchium latifolium
Smilax china
——— laurifolia
Spilanthus salivaria
——— urens
Solanum triste
——— racemosum
Spigelia anthelmentica
Tournefortia volubilis
Triumfetta Bartramia

Triumfetta lappula
Vandellia diffusa
Verbena jamaicensis
Waltheria americana

In Economy.

Agave americana
——- vivipara
——- cubensis
Alpinia altisssima
Amyris elemifera
——— balsamifera
Andropogon bicornis
Arundo donax
Bignonia paniculata
Boerhavia diffusa
Bromelia pitta
Capraria biflora
Carapa guianensis
Carthamus tinctorius
Cecropia peltata
Ceratonia siliqua
Cordia dichotoma
Crescentiacujete
Cucurbita lagenaria
Daphne occidentalis
Erythrina corolladendrum
——— excelsa
Elais guineensis
Ficus tinctoria
Galega toxicaria
Gleditsia triacanthos
Gomutu, E. India Palm
Gouania scandens
Guilandina moringa
Hibiscus tiliaceus
Hippomane biglandulosa
Isatis tinctoria
Maranta arundinacea
Mimosa unguis cati
——— tortuosa
——— eburnea
——— ceratonia
——— tamarindifolia
——— intsia
Momordica operculata
Morus papyrifera
Myristica americana
Ochroma lagopus
Oxalis frutescens
Pandanus odoratissimus
Parkinsonia aculeata
Phaseolus mungo
Phormium tenax
Piscidia erythrina
Pisonia aculeata
Poinciana coriaria (cæsalpinia)
Prunus noyeau
Pterocarpus draco
Rhizophora mangle
Sapindus saponaria
Sida indica
—— alnifolia
Theobroma Guazuma
Trixis toxicaria
Vitex trifolia
Volkameria aculeata
Zanthoxylon clava Herculis
——— tinctorium

VALUABLE WOODS.

Adelia arborea
Amerimnon album
Arundo bambos
——— spinosa
Avicennia tomentosa
Bactris clavata
Bignonia Leucoxylon
——— pentaphylla
——— serratifolia
——— monophylla
Bucida buceras
Bumelia nigra
——— latifolia
——— excelsa
——— tomentosa
Cæsalpinia cristata
Calophyllum calaba
——— acuminatum
Cedrela odorata
Chrysophyllum glabrum
Citharexylon cinereum
——— quadrangulare
Coccoloba pubescens
Cordia Geraschanthus
Coumarouna odorata
Cupressus disticha
Diospyros ebenum ?
Hernandia sonora
——— ovigera
Hippomane mancinella
Hymenæa curbaril
Juglans alba
Juniperus bermudiana
Juniperus virginiana
Laugeria excelsa
Laurus paniculata
——— borbonia
——— salicifolia
——— caribæa
——— nigra
Mimosa peregrina
——— lebbeck
——— odoratissima
——— arborea
——— grandis
Myrodia turbinata
——— patens
Myrtus latifolia
——— crassifolia
Parivoa grandiflora
Pinus sylvestris
Piratinera guianensis
Polypodium arboreum
Possira simplex
——— cauliflora
Petrocarya exsucca
Quercus robur
——— rubra
——— alba
——— nigra
——— phellos
——— sempervirens
Robinia pseudacacia
——— violacea
Sophora arborea
Sterculia fœtida
——— platanifolia

Sturculea

Sterculia ivira
——— hirsuta
Swietenia mahagoni
Tectona grandis
Tetraptera aceroides
Theobroma caribæa
Trichilia arborea
Vitex divaricata
Vouapa simiri

FRUITS.

Achras sapota
——— mammosa
——— argentea
Adansonia digitata
Aleurites triloba
Anacardium occidentale
Annona muricata
——— reticulata
——— tuberculata
——— cherymoa
Artocarpus integrifolius
Averrhoa bilimbi
——— carambola
Bagassa guianensis
Blakea cauliflora
——— racemosa
Bromelia pinguin
——— karatas
Cactus melocactus
——— grandiflorus
——— triangularis
——— pereskia
Carica papaya. Africa
Carolinea princeps
Chrysobalanus icaco
——— microcarpa
Chrysophyllum cainito
Cicca disticha
Citrus aurantium
——— decumanum
——— medica
——— myrtoides
Coccoloba uvifera
——— barbadensis
Cookia grossularoides
Cocos nucifera
Cuma guianensis
Cratæva capparoides
Dialium guineense
Diospyros lotus
Duroia eriopila
——— glabra
Eugenia malaccensis
——— jambos
——— floribunda
——— uniflora
——— tainitensis
Ficus carica
——— beughalensis
——— trigona
Jambolifera pedunculata
Inocarpus edulis
Juglans sativa
Laurus persea
Macoubea guianensis
Malpighia glabra
——— lucida
——— urens

Mammea americana
Melicocca bijuga
——— dioica
Mimosa fagifolia
——— inga
——— farinosa
Mangifera indica
Mouriri lucida
Musa sapientum rubra. Otaheite
Omphalea diandra
Parinari montana
Passiflora laurifolia
——— quadrangularis
——— maliformis
——— fœtida
Pekea tuberculata
——— trifolia
Phœnix dactylifera
Psidium maliforme
——— guianense
——— aromaticum
——— polycarpon
Punica granatum
Rhamnus jujuba
Saouari glabra
Sorbus domestica
Spondias mombin
——— myrobalanus
——— dulcis
Tamarindus indica
Terminalia catappa
Ximenia americana

Exotics, *curious or ornamental.*

Abroma augusta
Acrostichum rhizophyllum
Agave soboliflora
Ægiphila martinicensis
——— manabea
——— scandens
Adelia acidoton
Adenanthera pavonina
Æschynomene grandiflora
——— sesban
——— indica
——— aculeata
——— sensitiva
Aletris hyacinthoides
Allophyllus racemosus
Alpinia grandifolia
——— dichotoma
——— capitata
——— maculata
——— polystachia
——— hirsuta
Althæa racemosa
Alstromeria salsilla
Amaryllis belladonna
——— formosissima
——— longifolia
——— humilis
——— sarniensis
——— vittata
——— aurea
——— atamasco

Amerimnon

Amerimnon latifolium
——— flexuosum
——— volubile
Amomum mioga
Amorpha fruticosa
Andromeda paniculata
Anethum graveolens
——— sowa
Anguria heterophylla
——— glandulosa
Anisophyllum pinnatum
Anthemis chia
Aukuba japonica
Annona asiatica
——— palustris
——— exsucca
Apalatoa spicata
——— aptera
Apeiba tibourbou
Aralia capitata
——— heterophylla
Ardisia clusiæfolia
——— punctata
——— pulchella
——— parasitica
Areca catechu
Aristolochia glandulosa
Arctotis tristis
Arethusa lucida
——— picta
——— pusilla
Arum arboreum
——— seguinum
——— maximum
——— fœtidum
Arum lingulatum
——— hederaceum
——— bicolor
——— repandum
——— hastatum
Asclepias viminalis
——— repanda
Asphodelus fistulosus
Asplenium soboliferum
Aster divaricatus
——— dumosus
——— vernus
Athanasia annua
Atragene austriaca
Atropa arborescens
——— physaloides
Azalea rosea
Bactris minor
——— sagittata
——— gracilis
Bannisteria laurifolia
——— chrysophylla
——— nitida
——— latifolia
——— dichotoma
——— cordifolia
——— villosa
——— mutica
——— purpurea
Basella alba
——— rubra
Bauhinia divaricata
——— variegata
——— tomentosa
——— aculeata

Begonia glabra
——— hirsuta
Bellis maritima
Berteria guianensis
Besleria melittifolia
——— lutea
——— serrulata
——— cristata
——— trinervia
——— corymbosa
——— pulchella
Betula alnus
Bignonia catalpa
——— æquinoctialis
——— pubescens
——— crucigera
——— echinata
——— glandulosa
——— argentea
——— stipulacea
——— ramiflora
——— inflata
——— punctata
——— tubulosa
——— fluviatilis
——— stans
——— incisa
——— radicans
——— indica
——— filicifolia
Blakea trinervia
Blechnum heptaphyllum
Bombax carolineoides
Bontia daphnoides
Bromelia polystachia
Brownea speciosa
Bryonia laciniosa
Buttneria aculeata
——— latifolia
Cacalia coccinea
Cactus phyllanthus
——— tetragonus
——— heptagonus
——— peruvianus
——— pendulus
Cæsalpinia sappan
Canna glauca
Casearia ramiflora
——— nitida
——— crenata
——— undulata
Calamus raphia
Calinea dioica
Calycanthus florida
Camellia japonica
Cananga laurifolia
Capparis cynophalaphora
——— tortuosa
——— breynia
——— frondosa
——— jamaicensis
Cardiospermum fruticosum
Caryota urens
Cassia viminea
——— bacillaris
——— sophera
——— glauca. E. Indies
——— planisiliqua
——— bracteata
——— floribunda

Cassia chamæcrista
——— pentagona
——— mollis
——— grandis
Casine maurocenia
Casuarina equisetifolia
——————— torulosa
Ceanothus africanus
Celosia cristata
——— paniculata
——— castrensis
——— carnosa
Celtis lima
Centaurea crupina
Cephaelis muscosa
——— tomentosa
Cerbera thevetia
Cerinthe minor
——— maculata
Cestrum diurnum
——— vespertinum
——— laurifolium
Chelone barbata
Chimarrhis cymosa
Chiococca bahamensis
Chionanthus caribæa
Chomelia spinosa
Chrysanthemum indicum
——————— tricolor
Chrysophyllum argenteum
Cipura paludosa
Cissus trifoliatus
Cleome viscosa
——— spinosa
Clematis florida
Clitoria ternatea
——— erecta
——— arborea
Clinopodium graveolens
——————— procumbens
——————— repens
Clerodendron infortunatum, flor. plenis
Clusia rosea
——— multiflora
Coccosipsilum violaceum
Coffea occidentalis
Combretum laxum
——————— decandrum
Columnea scandens
Colutea frutescens
Comocladia ilicifolia
Couceveiba guianensis
Conocarpus erecta
——————— racemosa
Convulvulus speciosus
——————— maximus
——————— malabaricus
——————— maculatus
——————— bicolor
——————— flavus
——————— parviflorus
——————— quinquefolius
——————— pentaphyllus
——————— heptaphyllus
——————— dissectus
——————— repens
——————— martinicensis

Conyza

Conyza arborescens
——— trinervia
——— alata
Corchorus fruticosus
——— olitorirus
——— capsularis
Cordia macrophylla
——— sebestena
——— juglandifolia
——— virgata
Coreopsis reptans
——— chrysantha
Cornus florida
Cornutia pyramidata
Coronilla scandens
Corypha frondosa
Costus arabicus
——— speciosus
——— malaccensis
Couratari guianensis
Cratæva capparoides
Crescentia cucurbitina
Crinum americanum
——— asiaticum
——— zeylanicum
Crotalaria arborea
——— laburnifolia
——— verrucosa
——— retusa
——— incanescens
——— chinensis
——— procumbens
——— lateriflora
——— alata
Croton aromaticum
——— fœtens
——— punctatum
——— gossypifolium
——— pallens
——— polygamum
——— trilobum
Cupania americana
——— macrophylla
Curatella americana
Cynanchum maritimum
——— hirtum
——— suberosum
——— latifolium
Cytisus tomentosus
Dalbergia procumbens
——— caudata
Daphne cneorum
——— collina
Datura fastuosa
——— tatula
Dianella cærulea
Digitalis obscura
Dipsacus lacinatus
Dioscorea vivipara
——— filiformis
——— guianensis
——— rajanoides
Diospyros tetrasperma
——— inconstans
Dodonæa viscosa
——— triquetra
Dolichos lablab
——— lignosus

Dolichos

Dolichos roseus
——— spicatus
——— acinaciformis
——— grandiflorus
Doecas surinamensis
Dorstenia cordifolia
Dracæna ferrea
Dracontium pertusum
——— palmæfolium
——— scandens
Echites undulata
——— umbellata
——— nutans
——— biflora
Ekebergia capensis
Elais americana
Elaphrum laurifolium
——— trifolium
Embóthrium adiantifolium
Epidendrum vanilloides
——— altissimum
——— carthaginense
——— coccineum
——— speciosum
——— umbellatum
——— ramosum
——— elongatum
——— satyrioides
——— lineare
——— cochleatum
——— cucullatum
——— spatulatum
——— nocturnum
——— ciliare
Epidendrum corymbosum
——— proliferum
——— nutans
——— difforme
——— uniflorum
——— multiflorum
Eranthemum semperflorens
Ehretia tinifolia
——— bourrerina
——— exsucca
Euphorbia tithymaloides
——— cotinifolia
——— lathyrus
——— dichotoma
——— glauca
——— antiquorum
——— neriifolia
Erithalis fruticosa
——— alpina
Erythrina crista galli
——— carnea
Eythroxylon havanense
——— distichum
Ethulia sparganaphora
——— bidentis
Eucomis punctata
Eupatorium dalea
——— corymbosum
——— scandens
——— secundum
Eugenia barbadensis
——— ramiflora
——— glauca
——— baruensis

Exacum

Exacum guianense
Fagara myrtoides
Fraxinus crispa
——— lentiscifolia
Ficus retusa
—— religiosa
—— indica
—— americana
—— linifolia
—— virens
—— racemosa
—— pertusa
—— rigida
—— hirsuta
—— glauca
Fuchsia coccinea
Galega carribæa
——— purpurea
——— virginiana
——— dichotoma
——— hirsuta
Gardenia florida, flor. simplicibus
——————— flor. plenis
——— thunbergia
——— crinita
——— armata
——— rania
——— aculeata
——— dumetorum
——— longiflora
——— microphylla
Gentiana coutoubea
Gesneria tomentosa
Gesneria coccinea
Glycine caribæa
——— picta
——— rubicunda
——— bimaculata
Gomphia nitida
Grewia pilosa
Guettarda speciosa
——— scabra
——— lucida
——— salicifolia
——— macrophylla
Gustavia augusta
Gypsophila perfoliata
Hamellia coccinea
——— chrysantha
——— corymbosa
Hedyosmum articulatum
Hedysarum latifolium
——— gangeticum
——— vespertilionis
——— gyrans
——— bupleurifolium
——— linifolium
——— lagopodioides
——— glomeratum
——— altissimum
——— triquetrum
Helicteres isora
——— baruensis
Heliconia marantifolia
——— psittacorum
——— flexuosa
——— hirsuta

Heliconia

Heliconia glauca (caribæa)
Heliotropium gnaphaloides
——— fruticosum
Hemerocallis flava
——— alba
Hemionitis palmata
Hibiscus rosasinensis, flor. simp.
——— flor. plenis
——— mutabilis flor. plenis
——— gangeticus
——— rugosus
——— diversifolius
——— vesicarius
——— trionum
——— abelmoschus
——— vitifolius
——— ficulneus
——— radiatus
——— manihot
——— cannabinus
——— heterephyllus
——— hispidulus
——— turbinatus
——— spinifex
Hillia parasitica
Hirtella americana
——— paniculata
Hippocratea scandens
Hoffmannia pedunculata
Hydrolea spinosa
Hypericum monagynum
——— barbatum
——— latifolium
——— guianense
Jacquinia armillaris
Jasminum officinale
——— sambac, flor. plenis
——— simplicifolium
——— azoricum
Jatropha urens
——— procumbens
Indigofera hirsuta
Ipomæa repanda
——— carnea
——— bona nox
——— filiformis
——— coccinea
——— speciosa
——— umbellata
——— tuberosa
——— macrophylla
——— grandiflora
——— quamoclit, flor. cocineis
——— flor. albis
Iris chinensis
——— versicolor
——— virginiana
Itea cyrilla
Justicia nitida
——— picta
——— coccinea
——— speciosa
——— pulcherrima
——— carthaginensis
——— paniculata (secunda)
——— umbellata
——— spinosa

Ixia

Ixia chinensis
Ixora coccinea
——- alba
——- secunda
Kæmpferia coronaria
Kitaibela vitifolia
Kœlreuteria paniculata
Lagerstroemia flos reginæ
Lantana radula
——— camara
——— aculeata
——— bullata
——— annua
Latania. Palm
Laurus nobilis
——— indica
——— fulgens
——— verticillata
——— ecalyculata
Lavenia decumbens
Lawsonia inermis
——— spinosa
Lecythis bracteata
Ligusticum levisticus
Leonurus marrubiastrum
——— tataricus
Legnotis elliptica
Ligustrum vulgare
Limodorum Tankervilliæ
——— altum
——— palmæfolium
——— corniculatum
——— spathaceum
——— parasiticum
Linum narbonense
——— strictum
Lisianthus glaber
——— chelonoides
Limonia triphylla
——— mauritanica
Liquidambar styraciflua
Liparia pinnata
Lobelia surinamensis
——— racemosa
Lycium japonicum, flor. plenis
Lygeum spartum
Macrocnemum coccineum
Magnolia cœrulea
Malachra radiata
Malanea sarmentosa
Malpighia nitida
——— mourila
——— crassifolia
——— coriacea
——— coccigera
Malvaviscus populneus
Mammea littoralis
——— verrucosa
Manettia coccinea
——— alba
Maranta sylvestris
Margravia umbellata
Marila racemosa
——— speciosa
Medicago scutellata
——— orbiculata
——— aculeata
——— hispida

Medicago

Medicago coronata
Melaleuca linarifolia
——— obliqua
Melastoma acinodendron
——— holosercea
——— quadrangularis
——— hirta
——— lanata
——— decussata
——— spatulata
——— biflora
——— umbellata
——— elegans
——— tamonea
——— agrestis
——— argentea
——— spicata
——— fragilis
——— ciliata
——— triphylla
——— grandifolia
Melia azederach
Melvilla speciosa
Menispernum carolinianum
Microtea debilis
Mimosa latifolia
——— jugata
——— tergemina
——— purpurea
——— plena
——— virgata
——— vespertina
——— latisiliqua
——— angustifolia
Mimosa decurrens
——— glauca
——— conglomerata
——— entada
——— scandens
——— palustris
——— longifolia
——— casta
——— sensitiva
——— argentea
——— bahamensis
——— quadrivalvi
——— asperata
——— eglandulata
——— from Botanay Bay
Do.
Do.
Do.
Metrosideros lanceolata
Menyanthas indica
Mirabilis jalapa, alba flava purpurea
——— longiflora
Moquilea guianensis
Monnieria trifolia
Morea iridioides
Morus hybrida
——— rubra
——— tatarica
Mullera moniliformis
Muntingia calabura
Myginda rhacoma
——— latifolia
——— myrtoides

Myginda

Myginda retusa
——— lineata
Myrobalanus fertilis
Myrospermum elegans
Myrsine africana
——— retusa
Myrtus communis, latifolia et angustif.
——— fragrans
——— virgultosa
——— disticha
——— crenulata
——— buxifolia
——— obtusifolia
——— cerasina
——— mini
——— lucida
——— ramiflora
——— paniculata
Nerium oleander, rubrum et alb.
Nigella sativa
——— damascena
Ocymum gratissimum
——— album
——— tenuiflorum
——— thyrsiflorum
Olea fragrans
Onopordum illyricum
Oenothera grandiflora
——— purpurea
Ophioglossum scandens
Origanum majoranoides
Oxalis frutescens
Panax morototoni
Panax attenuata
Pancratium amboinense
Parivoa tomentosa
Paullinia asiatica
——— glauca
——— punctata
——— capsularis
——— vespertilionis
——— multiflora
——— biflora
——— cærulea
——— serrata
Pelargonium capitatum
——— grossularioides
——— zonale
Pentapetes phœnicea
Petræa volubilis
——— erecta
Pittosporum lanceolatum
Petrocarya rigida
Phaseolus caracalla
——— vexillatus
——— lathyroides
———aconitifolius
Phœnix farinifera
Phyllanthus racemosa
——— conami
——— longifolia
——— mimosoides
——— glauca
Plumeria obtusa
——— pudica
Piper geniculatum
——— verrucosum

Piper aduncum
—— peltatum
—— argenteum
—— malamiri
—— verticillatum
—— acuminatum
—— trinervium
Pistia stratriotes
Pitcairnia angustifolia
——— racemosa flava et coccinea
Platylobium hieracifolium
Plumbago rosea
Plukenetia volubilis
Pisonia inermis
——— coccinea
Podalyria latifolia
Populus nigra
Poterium sanguis orba
Pothos acaulis
——— odorata
——— lanceolata
——— cordifolia
——— crassinervia
——— palmata
Portulaca triangularis
——— pilosa
——— uniflora
——— paniculata
Posoqueria longiflora
Prockia crucis
Pterocarpus ecastaphyllus
——— lunatus
Prinos glaber
Prunus pensylvanica
——— virginiana
Psoralea corylifolia
Psychotria repens
——— herbacea
——— parasitica
——— argentea
——— citrifolia
——— crocea
——— laurifolia
——— glabrata
——— nervosa
——— macrophylla
Pultenæa stipularis
Pyrus polveria
Rauwolfia scandens
Rhamnus theezans
——— trinervis
——— gynandra
Rhexia hypericoides
——— hirsuta
——— bicolor
——— geniculata
——— glomerata
——— palustris
Rhododendron ponticum
Rhus toxicodendron
——— lucidum
——— australe
Rivina octandra
Rohinia nicou
——— candida
——— littoralis
Rondeletia americana

Rondeletia arborea
Rolandra argentea
Rosa semperflorens
Rubus fruticosus
Rudbeckia triloba
——— caribæa
Ruellia ciliaris
Rumex aureus
——— dentatus
——— vesicarius
Ryania speciosa
Sagittaria sagittifolia
Sagus? Palm
Salix babylonica
Salvia coccinea
——— pseudococcinea
——— dominica
——— nilotica
——— hispanica
——— viridis
——— æthiopis
——— latifolia
Samya serrulata
——— crenulata
Sambucus ebulus
Sapindus auriculata
Saponaria vaccaria
Satyrium elatum
——— spirale
Saururus cernuus
Schousbœa speciosa
——— oppositifolia
Schradera elusioides
Sebacea aspera
Serrulata anthelminthia
Sida periplocifolia
——— atrosanguinea
——— cristata
——— secunda
——— multiflora
——— cistoides
Sideritis montana
Sideroxylon dioicum
Sideroxyloides ferreum
Silene rubella
——— viridiflora
Siphonanthus indica
Sloanea dentata
Solanum laurifolium
——— verbascifolium
——— bombense
——— glanduliferum
——— diphyllum
——— pulchellum
——— paniculatum
——— hirtum
——— fuscatum
——— triphyllum
——— mammosum, 5 dactylon
——— sessilifolium
——— obscurum
——— bahamense
——— polygamum
——— flexuosum
——— scandens
Solandra grandiflora
Sophora occidentalis
——— tetraptera

Soramia

Soramia denticulata
Spermacoce stricta
Spiræa salicifolia
——— opulifolia
Staphylea sambucina
Stœrbe arborea
Styrax glabrum
——- fragrans
Suriana maritima
Symphoria globulifera
Symphytum officinale
Tabernæmontana citrifolia
———————- echinata
Taligalea campestris
Tamarix gallica
Tamonea heterophylla
Terminalia benzoin
———————- trinitensis
Thrinax parviflora
———— acaulis
Thuja occidentalis
—— orientalis
Tillandsia utricularis
———————— lingulata
———————— paniculata
———————— monastachia
———————— polystachia
———————— racemosa
———————— flexuosa
———————— coccinea
Tournefortia glabra
———————— hirsutissima
———————— cymosa
———————— maculata
Tradiscantia cristata
———————— umbellata
———————— erecta
———————— bicolor
———————— ciliata
Tribulus cistoides
Trichilia barbata
Tricosanthes anguina
Trifolium officinale
Triopteris citrifolia
———————— volubilis
———————— acuminata
Trixis aspera
——— erosa
Turnera ulmifolia
———— pulchella
Urtica baccifera
——— altissima
Urena typhalæa
Valeriana dentata
Vandellia erecta
Verbascum boerhavii
———————— blattaria
Varronia lineata
———— curassavica
———— bullata
———— annua
Vinea guianensis
Viola hybanthus
—— ornata
Veronica filiformis
Vitex capitata
——- guianensis
Uniola paeniulata

Volkameria mollis
Vouapa bifolia
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Zanthoxylon clava Herculis
——————— ramiflorum
Kinkina, St. Domingo, Angustura Bark ?

Many others, not having flowered in the garden, cannot be ascertained.

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Woodburn, Mr. Wm. *Ditto*
† Woodfall, Mr. George, *Paternoster-row*
P Wodhull, Michael, Esq. *Shenford, Northampton*
Woodthorpe, Thomas, W. H. Esq. *Guildhall*
Woolf, Mr. Arthur, *Wood-street, Spa-fields*
Woolfe, J. R. Esq.
Worrall, Jonathan, Esq. *Micklam, near Dorking, Surry, or, at Mr. John Bond's, St. Mary Axe*
P Wotton, William Samuel, Esq.
Wrather, Mr. Roycroft, *Charing-cross, and* 36, *Francis-street, Newington-Butts*
P Wright, Charles, Esq. *Old Jewry*

Wright,

Wright, J. Esq. *Market-Drayton, Shropshire*
Wright, Mr. Robert, 5, *New North-street*
††Wyndham, Thomas, Esq. M. P.

Y

P Young, Arthur, Esq. F. R. S. &c. *Board of Agriculture, in Sackville-Street*
Young, William, jun. Esq. 2, *James-street, Adelphi*

Z

P Zenobio, Right Honourable Count Alvise

Where Errors have arisen in printing the Names or Residence of the Noblemen and Gentlemen in the above List, or where any Alterations are wished for, a note upon the Subject, addressed to the Collector, at the Society's House, in the Adelphi, will be attended to.

LIST OF THE CORRESPONDING MEMBERS OF THE SOCIETY.

Barbadoes, the Society for promoting Arts and Commerce, at
Caldwell, Sir James, Bart. *Castle Caldwell, Ireland*
Rogerson, Dr. John, *St. Petersburgh*
Rush, Dr. Benjamin, *Philadelphia*
Dancer, Thomas, M. D. *Superintendent of the Botanic Garden, Jamaica*
Titford, Isaac, M.D. *Spanish Town, Jamaica*
Chevalier De Souza, *Portugal*
Guthrie, Dr. Matthew, *Physician to the Imperial Corps of Cadets, at St. Petersburgh*
Baron Itzenplitz, *Counsellor of the Chamber of the Electoral Domains of the King of Prussia, and Knight of the Order of St. John, at Berlin*
Anderson, Dr. James, *Physician-General, Madras*
Webb, John, Esq. *Member of the Board of Trade, Bengal*
Roxburgh, Dr. William, *Calcutta*
Anderson, Alexander, M.D. F.R.S. Ed. *Superintendent of the Botanic Garden in the Island of St. Vincent*
Hynam, Mr. Robert, *St. Petersburgh*
Berezy, William, Esq. *of York and Berezy, in Upper Canada*
Vondenvelden, William, Esq. *Quebec*
Edelcrantz, the Chevalier, A.N. *Sweden*
Vitoftoff, his Excellency Mr. Alex. *Petersburgh*
Deriabin, Mr. Andrew, *ditto*
Titford, William Jowett, Esq. *Spanish Town, Jamaica*
Mac Rea, Alexander, Esq. *Demarara*
La Terriere, M.D. *Quebec*

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Place the Engravings so that the Names of the Inventors may either be upright or on the outside Margin of the Page, and take care to place the Impressions far enough within the Volume, that their exterior Edges may not be damaged, when they are subsequently cut.

R. WILKS, PRINTER,
89, Chancery-lane.

HONI SOIT QUI MAL Y PENSE